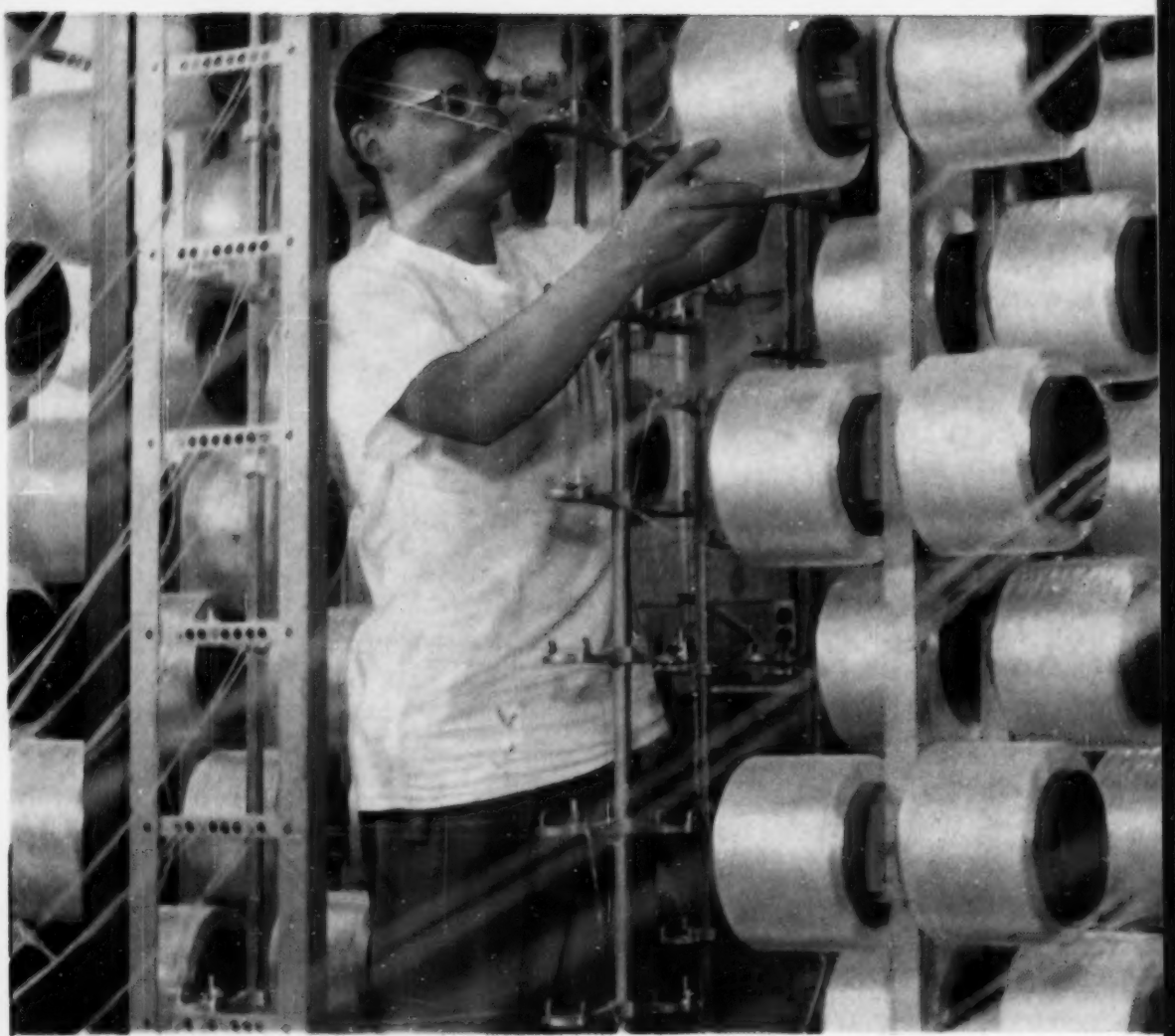
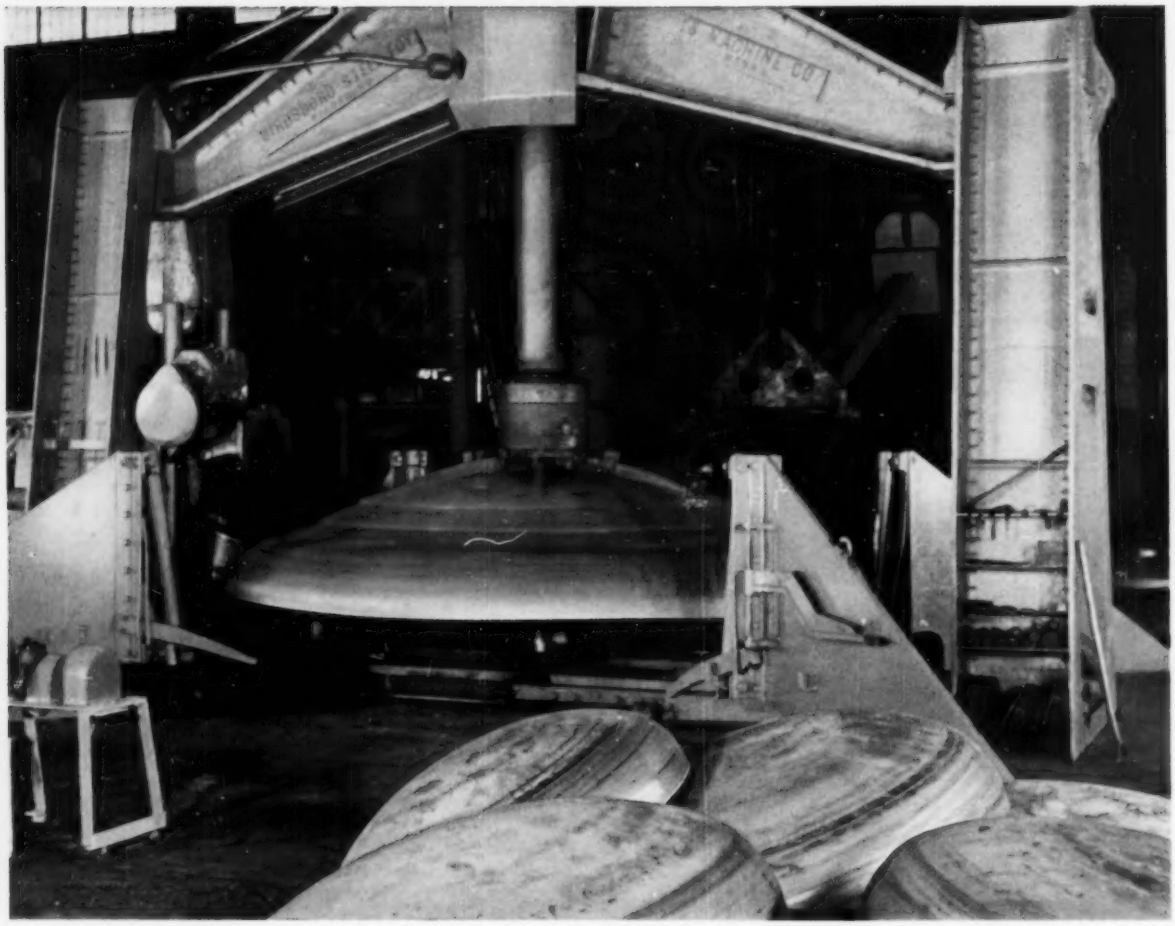
McGraw-Hill International

Management Digest



New fibers mean new fabrics—and new opportunities—for industry everywhere—p55

HOW TO HUNT FOR A PLANT SITE



At record speeds, "circle" machine shapes red-hot plate steel into gas tank domes. Volume must be marketed at low operating cost

Modern production methods like this

...need modern business machines like this

Machines keep pace with machines. To make today's production pay off, products must be moved into the market in great volume at low cost. This demands efficient processing of staggering amounts of paper work. And to do this job, Burroughs offers the most advanced business machines available.

The famous Burroughs Sensimatic, for example, offers automatic accounting to businesses of all sizes. Its exclusive job-control panel handles four distinct operations. Additional panels can be used for limitless versatility. And the Sensimatic's unsurpassed speed, accuracy and easy operation make it the backbone of modern accounting systems.

Your Burroughs man specializes in the latest business methods and machines available. With his training and experience he can help any business, anywhere. For his address, write to Burroughs Corporation, International Division, Detroit 32, Mich., U.S.A.

Call your Burroughs man

Burroughs Sensimatic handles many different kinds of accounting work automatically. It's fast, efficient, and *anyone* can operate it.

More work-ability . . .

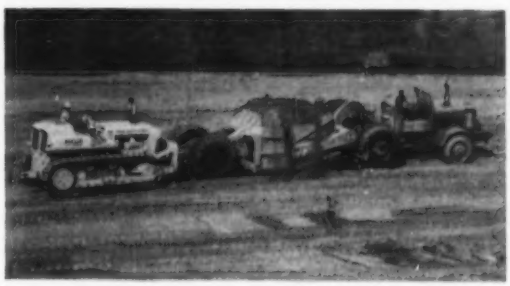
with this "Euc" TC-12 Tractor

Euclid's Model TC-12 Twin-Power Crawler has established entirely new standards of tractor performance. Powered by two 218 h.p. engines, it delivers unequalled drawbar horsepower and more work-ability than any other tractor.

Each of the tracks is driven independently through separate Torqmatic Drives giving the TC-12 faster, easier steering and greater drawbar pull at high speeds. There's no master clutch—any change from one of the three speed ranges to another is made under full power.

Owners say the TC-12 is years ahead in performance—that it has all the operating and service accessibility features they've wanted in crawler tractors. That's why you'll find these "Eucs" on a wide range of work—building roads, dams and airports, on clearing and grading projects, and on scores of industrial, mine and quarry operations.

If you use big tractors and other earthmoving equipment we'll be glad to supply information on the complete Euclid line with facts and figures that show why ***Euclids are your best investment.***



GENERAL MOTORS OVERSEAS OPERATIONS
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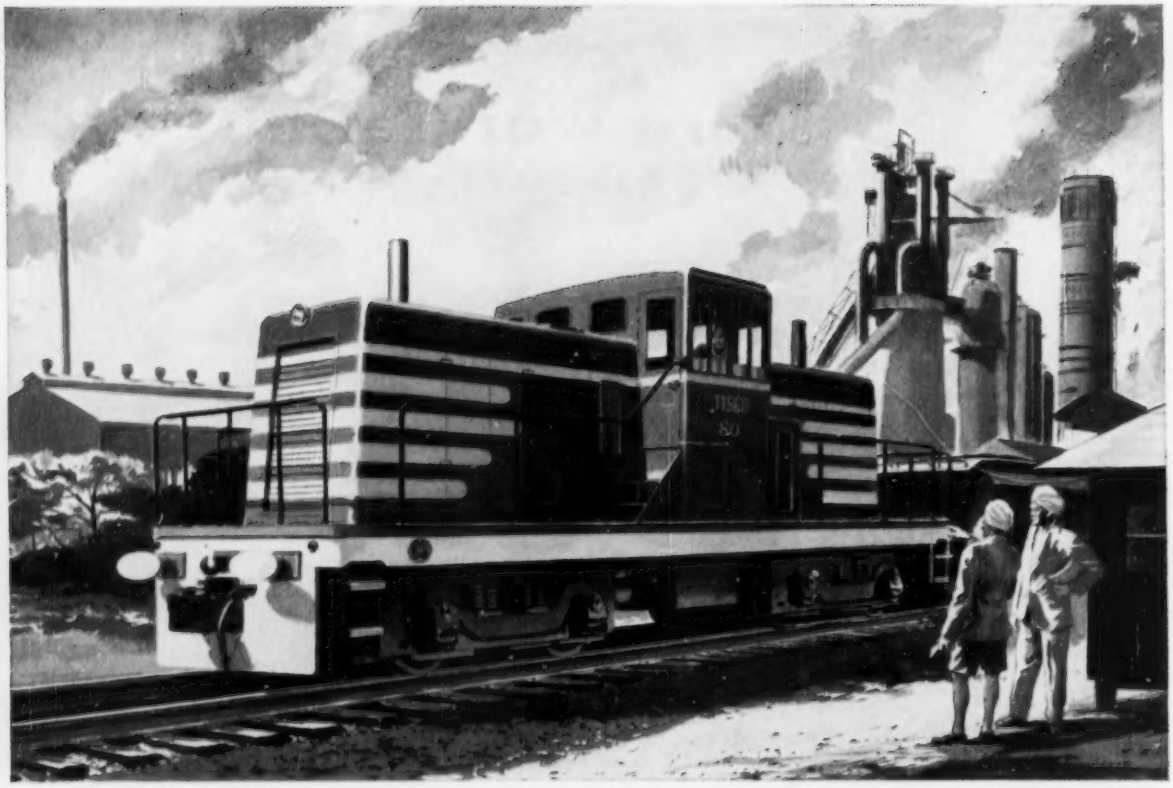
Newhouse, Lanarkshire, Scotland

Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE



Thirty-eight General Electric locomotives ordered by Indian steel mills

Tata Iron and Steel Company orders seven additional G-E diesel-electric units

As part of a major expansion plan of the Tata Iron and Steel Company of Jamshedpur, India, seven new General Electric diesel-electric locomotives will soon join 18 other G-E units already at work there.

Among the units ordered are two of the largest diesel-electric industrial locomotives built by General Electric, with a rating of 115 tons and 750 horsepower. The other units (four 80-tonners, one 25-tonner) are from G-E's standard line of industrial locomotives.

These India bound locomotives will operate under extremely grueling conditions, including temperatures that range up to 120 degrees, 100 per cent humidity and extremely dusty conditions. G-E diesel-electric locomotives were chosen for their high availability, efficiency, ease of operation, low maintenance costs and dependability under all conditions.

Find out how G-E industrial locomotives—diesel-electric or straight electric—can serve your needs. For information, contact your nearest International General Electric Company representative. (120-E5)

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Management Digest®

THE BEST FROM 68 BUSINESS MAGAZINES

JUNE 1957

VOL. 12 NO. 6

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For all piping, refrigeration, and air conditioning requirements, Mueller Brass Co. Streamline copper tubing is available in all required wall thicknesses, and hard or soft tempers.

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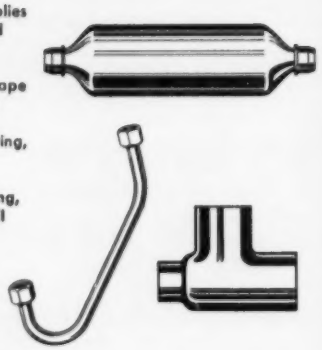

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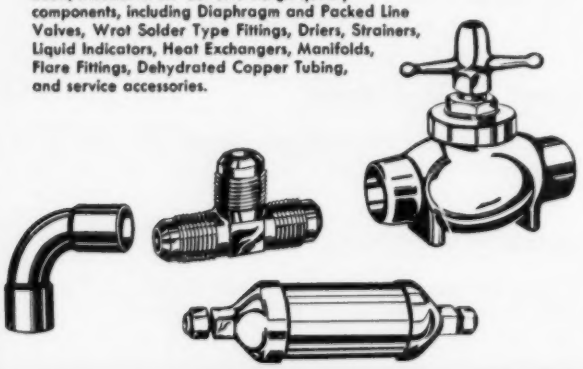
For virtually every refrigeration and air-conditioning need, Mueller Brass Co. offers high quality components, including Diaphragm and Packed Line Valves, Wrot Solder Type Fittings, Driers, Strainers, Liquid Indicators, Heat Exchangers, Manifolds, Flare Fittings, Dehydrated Copper Tubing, and service accessories.



APPLICATIONS

For sugar and paper mills, breweries, distillers, and other industrial applications, Mueller Brass Co. copper tubing is supplied to customers' specifications.

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Mueller Brass Co. can pack mixed groups of items for delivery to different job sites for any customer—an added saving to you by reducing rehandling costs.

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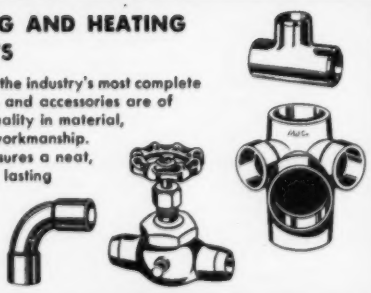
"Streamline", the industry's most complete line of fittings and accessories are of the highest quality in material, design, and workmanship. Streamline assures a neat, efficient, long lasting installation.



PLASTIC PIPE AND FITTINGS

Rugged Streamline polyethylene plastic pipe and all types of fittings, both copper and plastic, are excellent for a variety of jobs where the flexibility of plastic is needed.

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40 OUR 40TH YEAR MUELLER BRASS CO. 1917-1957

MUELLER BRASS CO. **Port Huron 43, Michigan, U.S.A.**

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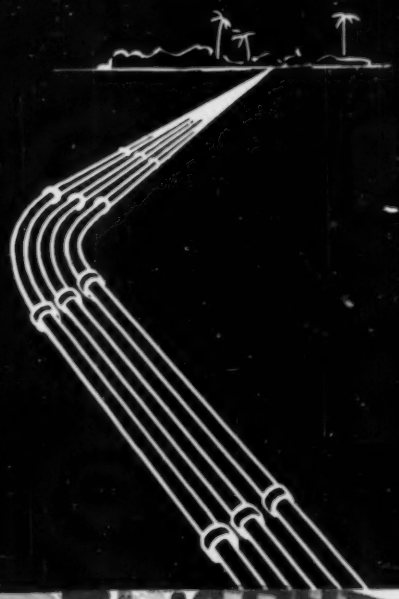
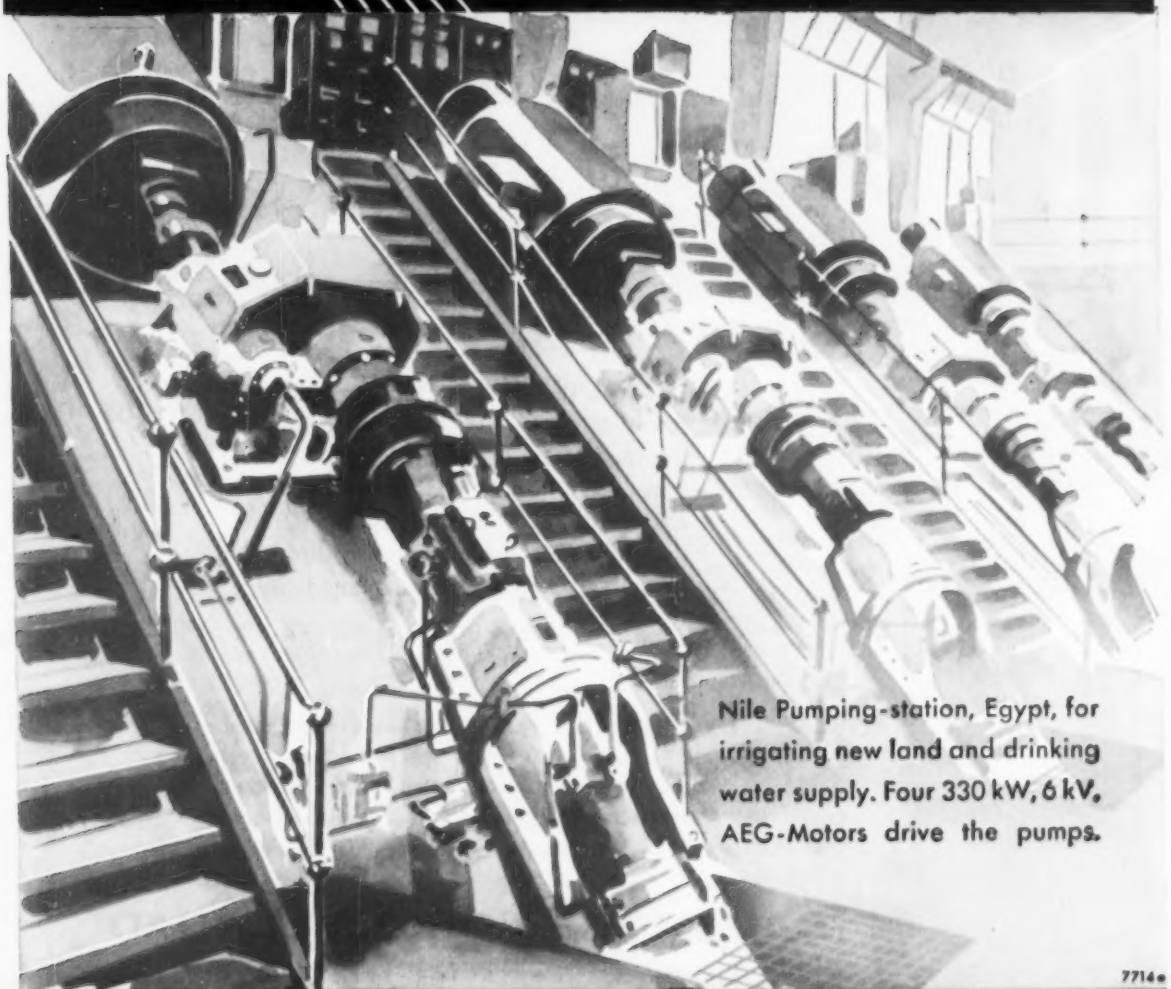


AEG

Irrigation Plant

Where flooded areas are to be reclaimed or arid, unfertile land irrigated, electrical power provides an invaluable aid – and where AEG electrical equipment in the pumping stations plays its important role.



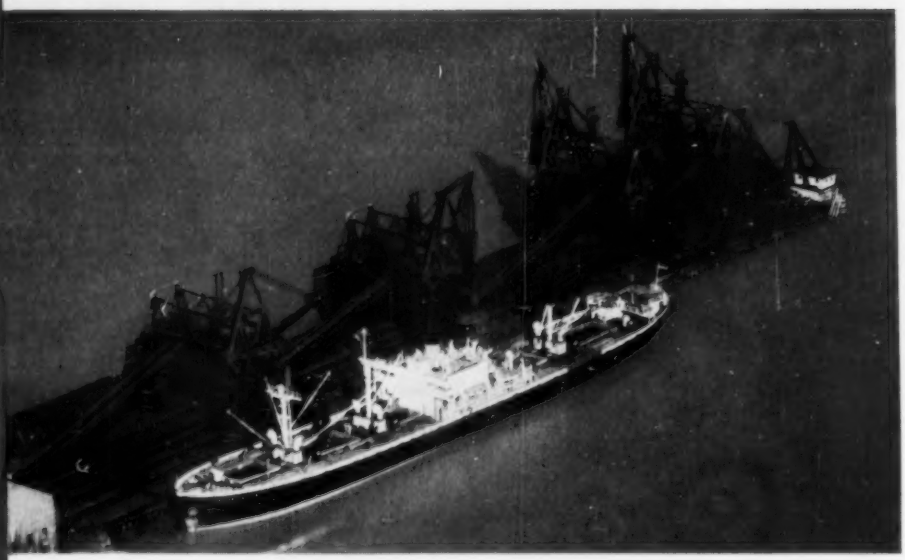
Nile Pumping-station, Egypt, for irrigating new land and drinking water supply. Four 330 kW, 6 kV, AEG-Motors drive the pumps.

7714e

ALLGEMEINE ELEKTRICITÄTS-GESELLSCHAFT

Berlin (West) EXPORT DEPARTMENT Frankfurt (Main)

B&O LINKS BITUMINOUS BOUNTY WITH OVERSEAS MARKETS



Handy is the word for B&O export coal. Accessibility of B&O mines to export facilities at tidewater means economical transportation costs. Baltimore and Ohio coal facilities at Curtis Bay, Baltimore, provide ample berthage, top loading efficiency and ample yard accommodations.

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BITUMINOUS COALS FOR EVERY PURPOSE

▶ WORLD TRENDS

OPPORTUNITY IN '60

European business weathered the winter—and the Suez closing—with unexpected ease. So there is time to look ahead to 1960, and an important forecast by the Organization for European Economic Cooperation.

The outlook: Great opportunity for European businessmen, and for their suppliers in other areas.

West Europe's economy, says OEEC, should continue to grow at a healthy rate, though not at the exceptionally fast clip of the past five years. While output per worker should advance at a strong 2.7% yearly rate (higher than recent U. S. productivity growth), labor supply will virtually cease expanding. That's because of the lower birth rate of the war years, and a probable reduction in the flow of East European refugees.

But OEEC insists that a slower growth rate should not justify less investment. Indeed, new plant and equipment plans in all countries promise an intensive period of capital spending—for steel, coal, roadbuilding, oil refining, nuclear energy.

Imports are expected to rise by 22% overall—with possibly a 40% jump in imported manufactures. And OEEC thinks Europe can pay for its increasing purchases overseas. One reason: Rising tourist earnings may "eventually eclipse Europe's prewar investment income" in financing the trade deficit.

OEEC does not underestimate the problems. Keeping a brake on consumer spending while labor is fully employed, already the most acute economic policy puzzle, will become more difficult. If inflation is to be curbed, living standards may have to advance more slowly. And that raises political problems to test the wisdom of a dozen Solomons.

BIG BUSINESS GROWS BIGGER

A trend to watch: Big business in Europe may grow larger as the Common Market takes shape. And bigness will come more often via industrial mergers.

A merger wave, helped along by the continuing credit squeeze and by world competitive conditions, is apparent in Britain. **Courtaulds Ltd. and British Celanese** have merged to form the world's largest artificial fiber group. They say frankly that the Common Market's progress is one of the reasons. . . . **The Hawker Siddeley aircraft group** has bought **Brush Engineering,** engine manufacturer. Hawker has money and research facilities; Brush has plant space but no money. . . . **Three large radio-TV makers** are selling off their receiving set business to others, and will concentrate on capital goods.

And note the increased tempo of international business partnerships.

—**A huge hydroelectric-aluminum project** is moving ahead in the Congo. A Belgian syndicate will team with French, Swiss, Italian, German, U. S., and Canadian aluminum companies.

—**Germany's Bayer** has increased its share ownership of two small U. S. chemical companies, merged former subsidiaries in Brazil, bought a company in Argentina and a plant site near Mexico City.

—**Major U. S. producers of atomic equipment** are actively searching for

Turn the page for more WORLD TRENDS

foreign partners in their quest for export markets. The first such team (American Machine & Foundry and Britain's Mitchell Engineering) recently sold a 15,000 kw. power reactor in Germany.

—Daimler-Benz A. G. and Curtiss-Wright Corp. (which directs operations of Studebaker-Packard, the U. S. automaker) have completed their agreement, pending for a year. S-P dealers will distribute Mercedes-Benz autos in the U. S., Canada, Mexico, and Cuba. The German engines and other equipment will be sold, and perhaps some day manufactured, by the Americans, who will have rights to Mercedes features. Finally, Daimler-Benz will get U. S. to help in making jet engines in Germany.

IN THE U. S. A.

At least one crucial element of general prosperity seems firmly in place for the years 1957-1960. And it has eased some of the worry about lagging auto sales, tight money, lowering profit margins (page 52).

The evidence at hand is the new McGraw-Hill survey of American industry's capital spending plans. New plant and equipment investment in 1957 is going ahead steadily, even a bit higher than December estimates. And, most important, investment plans hold to high levels through 1960.

Spending for research and development is soaring (up 20% this year)—and that means a parade of new products and processes. By 1960, the economists estimate that 10% of total manufacturers' sales will be in products not made in 1956 (page 18).

There will be ups and downs, industry by industry. And the consumer has not yet signalled his intention to match industry's investment with a rapid increase in his own purchases of durable goods. Still the economists guess the public will buy—and forecast good business.

Foreign traders, doing excellent business themselves, are not at all happy about legislation in the Congress.

As Management Digest went to press, the law authorizing U. S. membership in the Organization for Trade Cooperation looked dead—at least for the current session of Congress. And everywhere you hear louder protectionist cries, demands for tariff rises and import quotas.

The battle will be joined in 1958 when the Reciprocal Trade Agreements Act comes up for renewal. Both sides are girding for a great national debate that could—possibly, but not probably—turn the U. S. toward more protectionism.

Meanwhile, the market for imports—consumer goods as well as raw materials—is expanding nicely (page 16).

MORE BOUNCE FOR MAN-MADE RUBBER

Look for important advances in the production—and in the technology—of synthetic rubber.

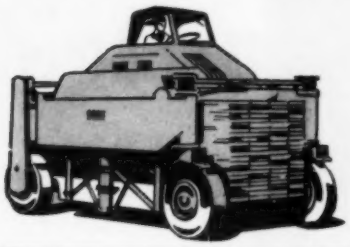
Those advances can come none too soon. It is clear now that there is no prospect of increased natural rubber supply in the next few years. Output of natural stagnates at about 1.9-million tons annually, while consumption of rubber has risen to 3-million tons—and will probably pass 4-million tons by 1960.

To meet this demand, synthetic production is set to expand considerably. Within a year or two, reports Petroleum Press Service, large-scale output will begin in Britain, Italy, France. And the Germans, Canadians, and Americans have ambitious expansion plans.

Meanwhile, the technology of synthetics is advancing along two different roads: (1) compounding synthetics "tailor-made" to special industrial uses, and (2) giving general-purpose synthetic rubber properties that will make it almost universally usable.

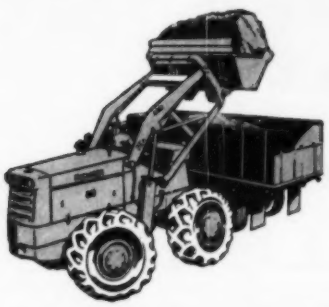
CLARK EQUIPMENT

moves mountains... *with the world's most complete line of materials handling equipment*

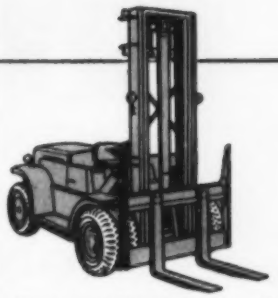


Straddle Carriers
8 models: 12,000 to 60,000 lbs

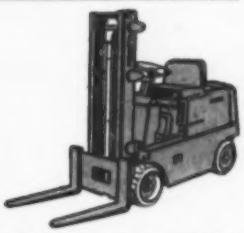
Michigan Excavator Cranes
3 models: 10, 15, 25 tons



Michigan Tractor Shovels
8 models: 16 cubic feet to 6 cubic yards

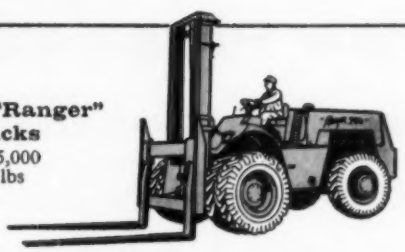


Pneumatic tire fork trucks
17 models: 2,000 to 40,000 lbs

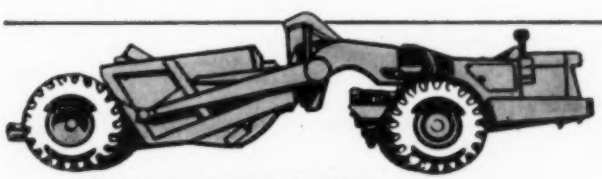


Solid tire fork trucks
29 models: 1,000 to 10,000 lb capacities. Gasoline, LPG, electric power.

Heavy-duty "Ranger" fork trucks
3 models: 15,000 to 30,000 lbs



Michigan Tractor Loggers
4 models: 10,000 to 20,000 lbs



Michigan Tractor Scrapers
3 models: 10½, 18, 27 cubic yds

Michigan Tractor Dozers
3 models: 165, 240, 375 hp

Whatever your material handling needs—moving logs, or steel beams or earth or *anything*—you can depend on Clark's 50 years of experience to give you the fastest, most economical machines *today* . . . and on Clark's continuing program of extensive practical research to lead the way *tomorrow.*

Towing Tractors
11 models: 500 to 12,000 lbs

Powrworkers
13 models: 1,500 to 10,000 lbs

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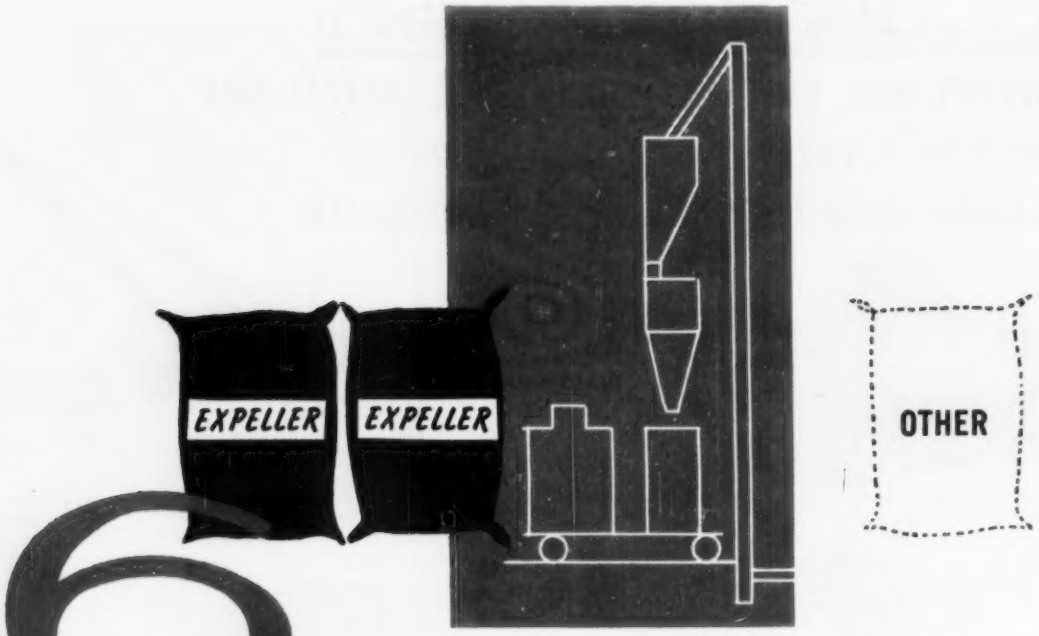

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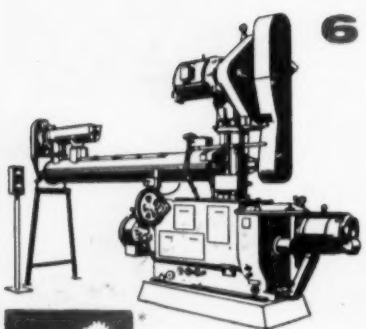
5. Lower maintenance and replacement costs
6. Interchangeability of Raw Materials



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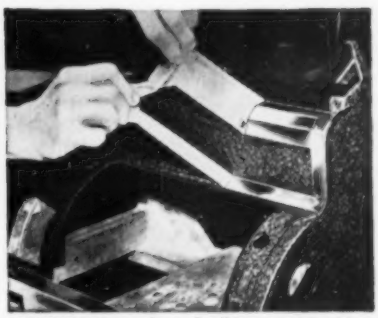
PRESSURE-SENSITIVE TAPES

Look what you can do with Industrial Tapes

SEAL boxes, bags, cans, etc., quickly, easily, economically with "SCOTCH" Brand Cellophane Tape. Above: Automatic Box Sealer applies pre-determined length of tape as box passes over the roller.



MASKING Tapes have flexible creped backings to allow them to fit curves and irregular surfaces easily. Above: "SCOTCH" Brand Masking Tape protects chrome strips during paint spraying.

FILAMENT Tape is a superior heavy-duty holding, bundling, and reinforcing material. Up to 500 lbs. tensile strength per inch of width; smooth adhesive insures complete tape contact—puts all the strength to work.

3M COMPANY

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NEW YORK CITY
JUNE 1957

Vaulting the U. S. Tariff Wall

Last year, Japan almost tripled its 1955 camera sales in the U.S.A. Israel had a better-than-200% increase in its brassware exports. Indian Oriental rugs sales rose 50%, and German chinaware enjoyed a 183% sales jump.

These are a few statistical samples Management Digest dug up after a visit to the U. S. World Trade Fair in New York (p 16). Add some more widely-publicized examples (Britain's U. S. auto exports went from 5,808 in the first quarter of 1956 to 19,938 in 1957) and you have what looks like a trend.

It's true. The U. S. market for imported consumer manufactures is growing. And while the world hears a great deal of advice on "how to sell the American market," one comment of a government expert stuck in our minds: If a product is better, really better, it will sell—even if the price is higher than a comparable U. S. product. Certainly lower price is a strong weapon. But quality is something American shoppers are searching for more insistently.

What about tariffs? True, some are virtually prohibitive. Yet even the celebrated bicycles and Swiss watches vault the new higher duties, and many other goods leap the wall easily.

This is not to say the new high-tariff demands in Congress are not disturbing (p8). They are—profoundly so. The many Americans who support freer trade can, and should, work harder to convince the nation of its vital stake in trade. Eventually, national interest should assure more liberal policies.

Meanwhile, the tariff should not be an excuse for an efficient foreign producer to decide against giving the U. S. market a strong try. Others do it, tariff or no, and succeed.

Project in Greece

A thoughtful businessman in Athens has written to Management Digest about the article on management training in France ("They're Going Back to School in Lille," Feb., p13). He is enthusiastic about the plan, and seeks advice on organizing such a school in Greece. We are putting him in touch with people expert in such things; if you have any ideas, write, and I will forward them to Athens.

Management training does not just appear in a community. Businessmen have to demand it, and convince their colleagues of the need. Then business must help set up, guide, and support the schools. We wish our Greek subscriber success in his project.

Vingt-et-un Automated

We heard the other day that someone at Burroughs Corp. had rigged a digital computer to play "Blackjack" (like Vingt-et-un) in its "spare time." The computer shuffles "cards" in its magnetic memory, deals by typewriter. When the hands are completed, the machine reveals its own "hole" card, and announces the winner.

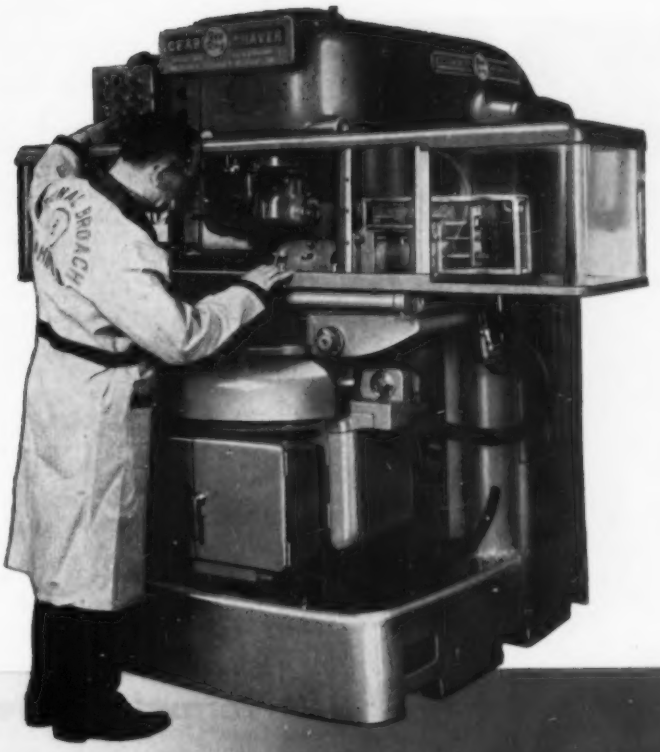
This seemed quite alarming at first. We had a mental picture of croupiers, technologically-unemployed, storming a fully automated casino at Monte Carlo. All the talk about machines replacing people came to mind.

But it isn't so. Someone had to build the computer, and then had to "teach" (or program) it to play Vingt-et-un. That required a lot of work and human brainpower.

The Age of Automation is going to require many more trained human beings, at all levels of activity. So next month, Management Digest hopes to present a report on the shortage of human brainpower, and its meaning for business.

Paul R. Miller, jr.

INCREASE GEAR SHAVING OUTPUT *with* VERSATILE SEMI-AUTOMATIC LOADING



The operator handling a conventional rotary gear shaving machine is required to make 7 separate motions for each work part shaved.

With semi-automatic loading this is reduced to just 3 operations.

1. **Place work gear on the pre-locater.**
2. **Press the start button.**
3. **Remove the shaved gear.**

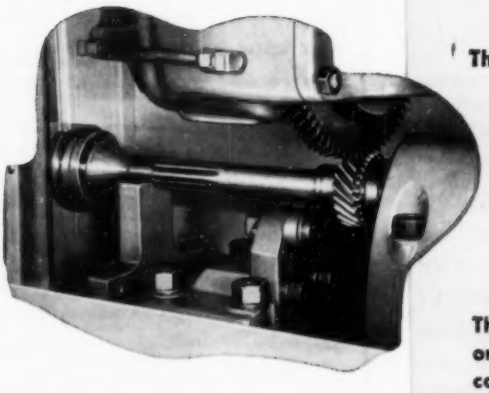
The rest of the cycle is automatic.

Results are:

- **Higher production**
- **Lower machining costs**
- **Less operator fatigue**
- **All the versatility of conventional shaving**
- **Greater safety**
- **Operator has ample time to serve 2 or more machines**

The approximate work locater and head and tailstock centers or plugs are the only work part changes that are additional to a conventional gear shaver.

Red Ring Shaving Machines, Models GCU and GCI may be equipped with this equipment.



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7388 *WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT*

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Amcel now brings you PARAFORMALDEHYDE FLAKE—formaldehyde already dehydrated into free-flowing solid packed in drums.

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Celanese Corporation of America is proud to be the pioneer producer of Paraformaldehyde Flake in commercial quantities at economical prices. Proud, too, of its quality.

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Australia, Melbourne . . . Hardie Trading Co. Ltd. . . . Plastics & resins.
Austria, Vienna XIX . . . Eugen Farber . . . Chemicals, plastics, resins, C. A. & textile products.
Belgium, Brussels . . . Keyser & MacKay . . . Resins.
Belgium, Gand . . . . Cocentra S.P.R.L. . . . Chemicals, plastics & C. A.
Denmark, Copenhagen . . . Johan Foge Jensen . . . Chemicals.
Denmark, Copenhagen . . . A/S Industriprodukter . . . Plastics & resins.
Egypt, Cairo . . . Padova & Co. . . . Textile products.
England, London . . . A. Revai & Co. (Chemicals) Ltd. . . . Chemicals.
France, Paris . . . Pautrot & Bonnet . . . Chemicals.
France, Paris . . . . . Loiret & Haentjens . . . Plastics & textile products.
Holland, Amsterdam . . . N. V. Consolco . . . Chemicals.
Holland, The Hague . . Handelmaatschappij Vos & Co. N. V. . . . Plastics.
Holland, Rotterdam . . . . . Internatio . . . . . C. A.
Hong Kong . . . Optorg Co. (Malaya) Ltd. . . . Chemicals, plastics & resins.
Hong Kong . . Getz Bros. & Co. . . . Textile products.
India, Bombay . . . Banwari Lal & Co., Ltd. . . . Chemicals, plastics, resins, C. A. & textile products.
Indonesia, Djakarta-Kota . . . Messers. N. V. Agung . . . Chemicals, plastics & resins.
Israel, Tel-Aviv . . . E. Huppert . . . Plastics & resins.
Israel, Tel-Aviv . . . Manfred Gottesmann . . . Chemicals & textile products.
Italy, Milano . . . Usvico (Societa Industriale Commerciale) . . . Chemicals, plastics & textile products.
Japan, Tokyo . . . Percy Breen . . . . . Plastics.
Japan, Tokyo . . . A. R. Brown, McFarlane & Co., Ltd. . . . Resins.
Korea, Seoul . . . Bando Trading Co., Ltd. . . . Plastics & resins.
Korea, Seoul . . . Celastar Textile Co. . . . . Textile products.
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Britain Searches for the "Mainspring"

Prime Minister Macmillan tries to set Britain on road to a new, stronger economy. Business improves, and the outlook is hopeful.

Spring in Britain is always a hopeful, quietly exciting time. But the past three months have seemed more hopeful and exciting than usual. A "new mood" is apparent—and it could transform the nation.

In part, the new mood is a reaction to the excessive gloom following upon Suez: Things just weren't as bad as they appeared. But there is more to it than that. Indeed, the stage seems set for a strong British recovery.

Three related factors are at work in Britain this June:

1. **A more realistic appraisal** of the nation's capabilities, and its relations with the rest of the world, leading to . . .

2. **Radical changes** in defense policy, that help permit . . .

3. **A new budget** that Prime Minister Macmillan's government hopes will restore a measure of incentive to management, and help set the economy on a more productive, profitable road.

Macmillan, in office just five months, has presented his policies not as acts of retrenchment, but as an exciting challenge to a "new" Britain, a skilled manufacturer of the machines that go to make up the new industrial revolution. If, as *The Economist* declares, the "nation's need is to face the world with a new honesty and fresh zest," Macmillan seems—to many outsiders, certainly—to be setting the pace.

Honesty, *The Economist* suggests, includes dropping the pretensions of a great imperial power. Throughout the postwar period until Suez, Britain managed to maintain a unique power position, far beyond its resources, by balancing its three key relationships—with the U.S.A., with Western Europe, and with the Commonwealth. At home, Britain tried to make a successful economic mixture out of great-power defense spending, an expensive welfare state, and industrial modernization. The nation got by—from crisis to crisis. But as 1957 began, it was clear to many Britons, and to a majority of the Eden government, that the balancing act was over.

It remained for Harold Macmillan to set new policies in motion. He cut Middle East losses. He patched up the alliance with the U.S.A. He turned the United Kingdom toward Europe, and the embryonic Common Market. Reconciling Britain's Commonwealth ties with a new relationship to Europe will be difficult, but London seems determined not to "miss the boat" to the Continent.

The historic White Paper on Defense came next: British overseas military commitments are to be reduced, conventional arms are to be virtually scrapped, and almost total dependence placed on the machines and missiles of "push-button war." Military spending will be slashed 20% over the next year, and Britain will devote its efforts to creating a compact, highly organized—but less expensive—nuclear defense pattern.

The new defense policy is expected to free scarce technicians—and important industrial capacity—for concentration on exports. And the money that will be saved on defense is already being put to work in the new budget.

The budget represents almost as radical a shift in thinking as defense. It gives tax relief, not so much to the lower income groups, but to the middle and upper income folk. For the first time since the war, *Business Week* declares, "incentives" have been put ahead of "equality."

The Conservatives now can claim credit for reducing the tax burden on Britain during their term of office. But there will be a fight—and Macmillan's government will have to prove before the next election that greater incentives to managers and professional people will bring more prosperity to all.

There's this economic thinking behind the new budget:

—The British economy is in much sounder shape than a year ago. Trade is in balance, exports have been rising for a year, and imports have been checked. Sterling has a healthier tone.

—Though industrial production has not risen for 18 months, a good bit of new industrial investment is in place and there has been a shift of resources to the strongest export industries. The new investment should soon begin to pay out in increased production. And if tax cuts encourage expansion, they should reduce the danger of more inflation.

Inflation, of course, is the major problem. If expanding production—already apparent in some industries—does not quickly push up productivity of British workers, to offset the wide wage increases that are pending, prices will rise. And Britain's position in world markets cannot stand more than the smallest price rises.

There is a "glittering opportunity" for Britain, says *The Economist*, if all British people will stand for, above all else, "a high investing, high producing, high earning, and high profit-making society." This is the "only future for Britain," and should be the "mainspring" for all policy. ●

Digested from The Economist, Apr 20, p199; Business Week, Mar 30, p41; Apr 13, p48, 150

U. S. Imports: Consumer Goods Come

What kind of market for imported consumer goods in the U.S.A.?

A visitor to the first U. S. World Trade Fair (left) got the impression that the market is as wide and diverse as the nation itself. During the last two weeks of April, nearly 800,000 persons—buyers for retail, importers, exporters, manufacturers, and ordinary consumers—trooped through the four huge exhibition floors of the New York Coliseum. They saw the products of 59 nations and some 3,000 individual exhibitors—probably the largest display of foreign consumer goods ever mounted in the Americas.

To be sure, the great bulk of the U.S.A.'s $12,000-million annual imports consists of industrial raw materials and staples like coffee and sugar. These have enjoyed the largest gains in import volume. But, relatively speaking, imports of finishing consumer items are expanding rapidly too—and many products have shown spectacular gains in the past few years.

Two related trends work to the advantage of imports:

—**Personal income in the U.S.A. sets new records each year;** this means larger "discretionary spending power" for factory workers as well as business and professional people. All are able to buy many more things beyond the necessities of life (one car, one televi-

JAPAN mounted one of the largest displays; typical products—like housewares above—have scored big advances in U. S. Sales of china ornaments rose 183%, from '55 to '56.

ITALIAN food and textile men, espresso machine makers, auto firms were on hand. Example: Sale of Italy's marble vases in the U.S.A. rose 40%—to $1.3-million—during last year.

EAST EUROPE took part, with Czech glass and press (above), also Polish and Yugoslav government displays.

INDIA's textiles made for a colorful display, along with brass, rugs, tourist attractions. Altogether, 59 nations showed everything from toys to tennis rackets, and beds, sports clothes, foods, cameras, clocks, objets d'art of every type.

to the Fair

sion set, are the kind of things Americans consider "necessities"). And they have the leisure time to carefully shop the market.

—Americans are insisting on a wide choice of color and style—at all price levels. They are exercising "taste," seeking more diversity and quality. And they are displaying an increased "awareness of the world," an attitude that has developed steadily over the past two decades as a result of war, tourism, mass media, movies and other cultural forces.

Neither of these trends means that Americans are buying anything with a foreign label. If something is really better and more distinctive, and it is promoted well, it will sell—even if the price is higher than a comparable domestic product (p. 12).

That is not to say that price is unimportant. If a foreign exporter can offer a more common, mass-produced, non-luxury item cheaper than his U.S. competition, he'll make more money than the man who depends on luxury appeal alone. The Volkswagen is not a hand-made luxury, yet few imports have ever had such an impact on the U.S.A. Nor is a metal ironing board a luxury. But one foreign manufacturer has sold many of them (MD, Jan. p 36).

The biggest gains among consumer goods in the past two decades have been made by autos (from 1% to 10% of total dollar volume of consumer imports); by jewelry and watches (from 12% to 15%); by cutlery and hand tools (1% to 4%). Christmas ornaments, furniture, typewriters, sewing machines, bicycles are other examples.

And note the striking increases marked up by some representative consumer items in the past two years alone. For example: Dollar sales of Japan's photographic goods and finished woolen manufactures jumped 83% and 79% respectively; Danish silver tableware rose 76%; China ornaments from West Germany soared 183%, and from Japan, 155%. Swiss lace curtains rose 65% and Israeli brass over 200%. ●

Japan Exports: Floating Fair Bids For Asian Trade

Digested from BUSINESS WEEK Mar30, p74

As Japanese exporters displayed their goods in the New York Coliseum (left), their colleagues at home were trying to measure the results of the voyage of the Nissho Maru (above), just back from a two-months visit to South Asia. Outfitted with samples of products from textiles to model hydroelectric plants, the ship is the latest idea in Japan's attempt to expand exports.

Though some Western businessmen hardly welcome these competitive efforts, most statesmen wish Japan success. They reason that despite Japan's present prosperity, the economy is shaky. Only a large expansion of exports, they believe, can maintain a slow steady growth in the nation's living standards.

The alternative is bound to be great internal economic stress—and possibly political pressures to make a deal with Communist China on the kind of terms drafted by Peking and Moscow.

That is something the diplomats and strategists do not want to see. For Japan represents more than 90-million people and strategic

Story continues on p18

IN KARACHI Japan's floating fair (top) draws Pakistani visitors to consumer goods like phonographs (right).

islands: Its technology, its industrial machine, are the most powerful in Asia.

One important aspect of the economic problem is easily stated. Japan's current prosperity is built on a boom in the West that has, among other things, helped Japan crack the U.S. market in a way completely unforseen 10 years ago. Japan leans more and more on raw materials from the West, and faces a steady upward pressure of prices. The nation finds it increasingly difficult to remain a "low-cost" producer.

Since the emergence of Communist China, many observers have insisted that Japan must tie its technology to the markets and raw material resources of South Asia. That's reminiscent of the militarists' "Greater East Asia Co-Prosperity Sphere"—but with all the difference in the world: Never again can Japan hope to dominate the area politically.

There are good reasons for closer Japan-South Asian business relations. Japan has the industrial plant capable of supplying the consumer goods and capital equipment that South Asia needs to industrialize. Toyko can call on a good supply of technical knowledge, and a less abundant—but skilled—pool of management talent. Japanese businessmen know the market; they can adapt their products to it with more speed and care than most U.S. and European exporters.

But difficult problems hinder trade development. One is the shortage of capital. Japan needs money to modernize and expand its industry, and for the credits that its customers require to finance purchases in Japan—even beyond the reparations payments Japan is making to the area.

It is hard to calculate these capital needs. One well-informed banker estimates Japan's over-all long-term capital needs at something like $20,000-million. That money cannot be found in Japan.

For several reasons Japan cannot import great amounts of capital through equity investments by Europeans and Americans. And while Japanese credit is excellent now, tight money in the New York and London markets makes large-scale private financing difficult. Nor has Japan been able to draw heavily on international lending agencies.

Some thought has been given to this scheme: divert a portion of the U.S.A.'s huge military aid payments in South Asia through Japan. Also, there are indications that the World Bank may find a way to help—with loans that would permit Japan to buy raw materials in South Asia, and to extend credits for capital goods to its customers there. ●

New Products Set the Pace

Some industries move fast, others stagnate. An important survey tells the story.

Growing national averages of industrial growth can be misleading: ask any producer or investor in a stagnating industry.

For a fascinating panorama of growth and decline, look at the April issue of the U.S. Commerce Dept.'s *Survey of Current Business.* In it, economists have put together a comprehensive study of output trends in 288 different products, telling—in statistical form—the story of changing technology and tastes in the U.S.A.

The trends apparent are relevant not only to the U.S.A. economy, but to the entire industrial world.

New products set the pace. U.S. businessmen, the authors declare, have "concentrated to an unusual degree on developing and marketing new products." Much of the nation's expansion, they say, is the direct result of production research and aggressive marketing.

Of the 288 different goods and services studied, one-third are classified as "fast-growing," defined as having an average annual rate of output growth of 7½%—twice the national average. About one-half are termed "moderately-growing"—from 0 to 7½%. The rest are in a decline.

Below is a brief sampling:

Fast-Growing

There are 98 products in this category, 43 of them "new" (first produced in significant quantity in the last 25 years). Most major industries are represented, although unevenly. For example, chemical lines in the group number 40, apparel lines only three. The only major industries not represented in "fastest-growing" are leather and printing-publishing.

At least 40% average annual growth (since 1929, or first year of significant volume output):

titanium (1949)	*TV sets* (1940)
detergents (1935)	*plastic pipe* (1950)
antibiotics (1944)	*rubber mattresses* (1947)
vitamins (1938)	*tufted carpets* (1951)
polyethylene (1943)	*dryers* (1947)

20% to 40% growth:

diesel locomotives (1932)	*electric shavers* (1932)
DDT (1944)	*canned baby food* (1934)
air pass. miles (1929)	*helium* (1939)
paper milk ctns. (1939)	*home freezers* (1946)

10% to 20% growth:

plastics, resins (1929)	*canned fruit juice* (1929)
sulfa drugs (1937)	*magnesium* (1930)
food mixers (1938)	*electric clocks* (1929)

7½% to 15% growth:

electric stoves (1929)	*rayon* (1929)
oil pipelines (1939)	*oxygen* (1929)
women's suits (1929)	*truck trailers* (1939)
outboard motors (1929)	*electric fans* (1929)

Moderately-Growing—0 to 7½% annual growth:

bicycles (1929)	*steel barrels* (1933)
gas pipelines (1940)	*cigarettes* (1929)
motor fuel (1929)	*corn pickers* (1929)
trucks (1929)	*telephones* (1929)

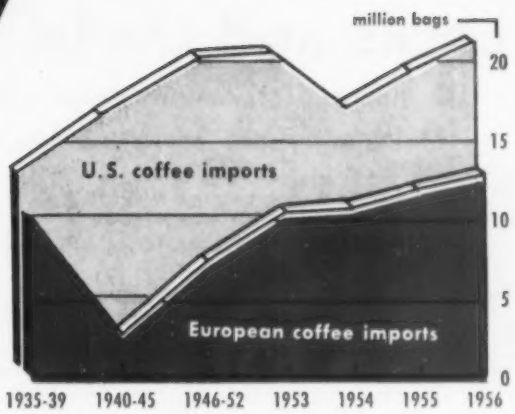
And these products are declining:

electric locomotives (1932)	*men's suits* (1929)
refined lead (1929)	*work shirts* (1929)
electric irons (1929)	*structural tile* (1937)
railroad cars (1929)	*cotton tire cord* (1929)
cigars (1929)	*leather luggage* (1929)
wire nails (1929)	*leather gloves* (1929)
anthracite (1929)	

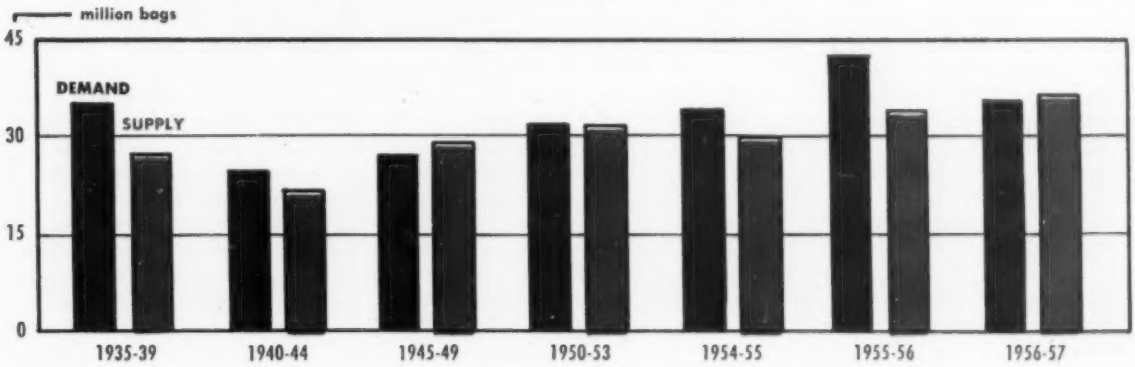
The Coffee Story

Digested from LATIN AMERICAN BUSINESS HIGHLIGHTS

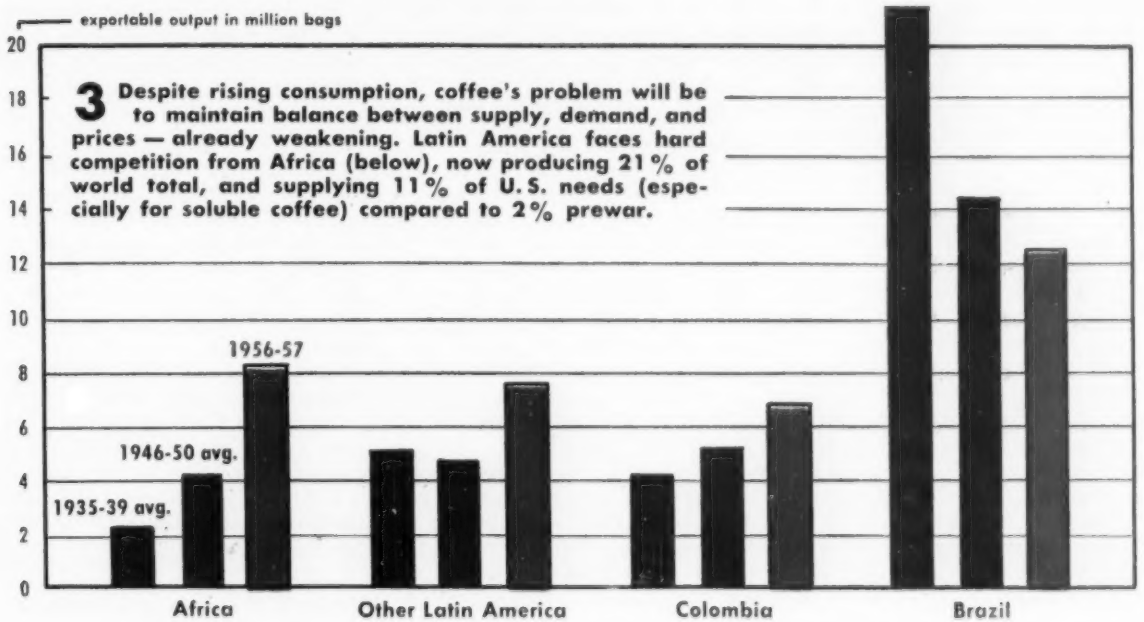
1 **Last year, coffee imports hit record 36.7-million bags, 35% above prewar. Demand in Europe and U.S.A. (chart, right) rises steadily, though per capita U. S. consumption still has not regained 1946-49 high. More population, more coffee per person, should bring new consumption records in years ahead.**



2 **Coffee production dropped after the record 1955-56 year, and supply is nicely balanced with demand (chart, below). Most of the drop was due to sharply lower Brazilian crop — and in the year beginning July 1, Brazil may again be producing 18-20-million bags. Indeed, the outlook is for a large increase in coffee output as new trees everywhere in the world begin to yield fruit.**



3 **Despite rising consumption, coffee's problem will be to maintain balance between supply, demand, and prices — already weakening. Latin America faces hard competition from Africa (below), now producing 21% of world total, and supplying 11% of U.S. needs (especially for soluble coffee) compared to 2% prewar.**



Locks and Garlic Test the "Idea Mills"

● **Independent, non-profit researchers span the world seeking answers to industry's problems.**

● **Here's the story of "SRI," one of the largest, most cosmopolitan American research institutes.**

Digested from the WALL STREET JOURNAL, Apr 18, p1

For generations, India's locksmiths have hammered out massive, easy-to-open, lever-type locks requiring cumbersome keys. For security, a single door might have four such locks, opened by a quartet of keys. With some American help, India's Small Industry Institutes and a Danish lock specialist today are teaming up to modernize the nation's locks.

A California food processor has been plagued with a familiar household problem—getting rid of garlic and onion odors. A research chemist suggested a possible solution—stacking layers of stale bread between tons of drying onions and garlic bulbs. The stale bread would absorb obnoxious odors and later could be sold as flavored croutons for soup.

These are but two of the many projects of Stanford Research Institute (SRI), one of America's nine independent, non-profit contract research organizations. These institutes, noted for flexibility of operation that sometimes approaches the bizarre, take on almost any kind of research, but most of their work falls in between the pure scientists in a university and the applied researchers in an industrial laboratory.

Widely varied projects handled by these nine institutes cost about $100-million annually, nearly double the total as recently as 1954. (Indeed, only three of nine were even in existence prior to World War II.) This is only about 2% of the $5,000-million spent for research in the U. S. each year. But the impact, in the opinion of a Standard Research executive, is "a lot more than 2%."

The disproportionate influence of research institute work stems from its exploratory nature and long-range effect. By opening new avenues of product or operational investigation, institutes may stimulate companies to make research a larger part of their business.

At Stanford Research, in Palo Alto, California, a staff of 1,450 persons now is at work on 415 engineering, physical science, and economic contracts for industry and the U. S. government. About a third of last year's work was clearly in the field of economic research, although the "team approach" puts an economist on many physical science problems.

Such was the case with a project that had its beginnings in ordinary beach sand streaked with reddish-brown grains of phosphate. The client was a Mexican company, Minera-Fornos, S. A., originally formed to exploit phosphate deposits in Mexico's Baja California. The Mexican company asked Stanford Research to find a process to refine poor quality beach sand, containing 4% phosphate, to commercial quality, with 25% or more.

After six months work, SRI found it could upgrade the sand economically by a flotation process. Researchers discovered that if a fatty acid were added to the sand, the tiny phosphate articles would become water repellent but would adhere to air. When air was shot into a fluid sand mixture, the acid-coated phosphate particles floated to the surface. This produced 20% phosphate sand, which could be refined further to nearly 30% phosphate.

The process was patented and turned over to the client. The Mexican company didn't want to build a refining plant. A major U. S. mining company is interested, however. And Stanford Research has a contract to help.

SRI's research jobs vary widely in size and subject. Some last two weeks and cost only a few thousand dollars; others may span several years and cost many hundreds of thousands of dollars.

A good deal of SRI's work takes research teams outside the U. S. A.; currently 18 researchers are at work in eight nations. For example, Stanford Research was instrumental in setting up India's Small Industry Institutes at Delhi, Bombay, and Madras. The main stress, explains Dr. J. Ben Lieberman, SRI industrial economist, is on "producing things that are needed that can be made with local materials." At the Bombay unit alone, 200 "schemes" are being developed; they range from manufacturing shoe eyelets to fabricating medium-sized chains.

Combining economic and physical research, as SRI does on many projects, does not necessarily make for a better product. But it does better enable a businessman to decide whether his new product will sell now or in the future, states SRI's director of economic research. "We can't guarantee success through an economic study," he emphasizes, "but it's cheaper to use it than to go blindly ahead."

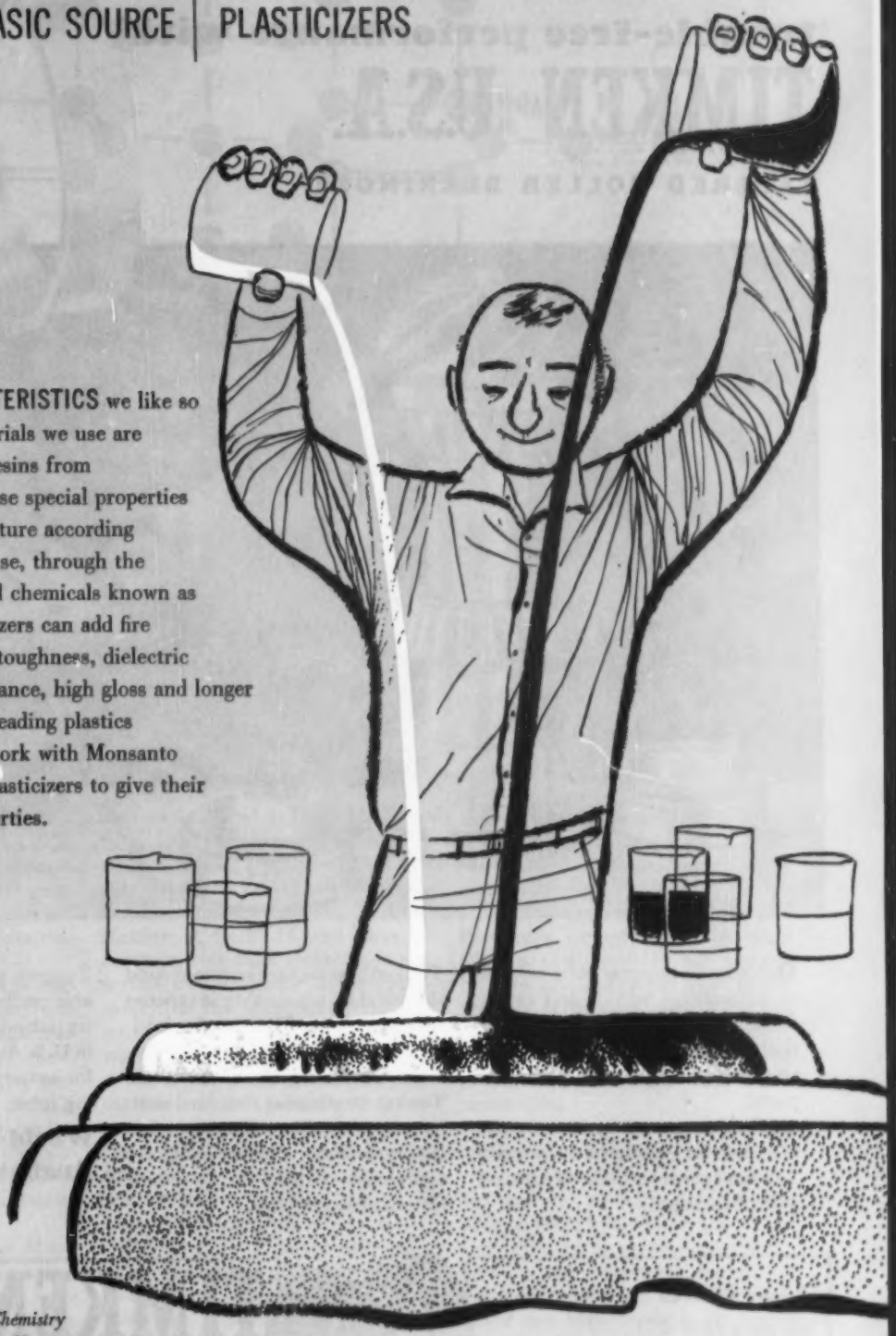
On occasion, various members of a SRI team will come up with different recommendations. Not long ago, the engineer member of a research team advised a client that it was technically feasible to process its records through an electronic computer. But an SRI economist concluded that the company didn't have enough paper work to warrant use of a computer. This client might have been mislead if he had not had the economic study.

In another instance, Stanford Research most emphatically urged a client, the Bank of America, to turn to electronic computers. Six years of study resulted in ERMA —a 25-ton machine that does all the bookkeeping for 50,000 checking accounts. ●

RESEARCH continues on page 23

MONSANTO

BASIC SOURCE | PLASTICIZERS



MOST OF THE CHARACTERISTICS we like so much in the plastics materials we use are not present in the basic resins from which they are made. These special properties are added during manufacture according to the plastic's intended use, through the addition of various special chemicals known as plasticizers. These plasticizers can add fire resistance, flexibility and toughness, dielectric properties, abrasion resistance, high gloss and longer life. Most of the world's leading plastics molders and fabricators work with Monsanto to obtain just the right plasticizers to give their product the desired properties.

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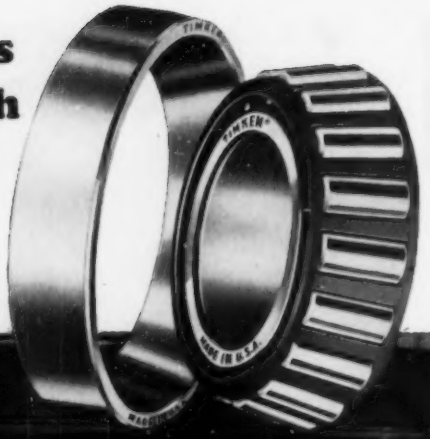

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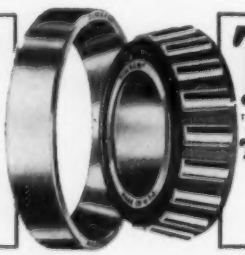

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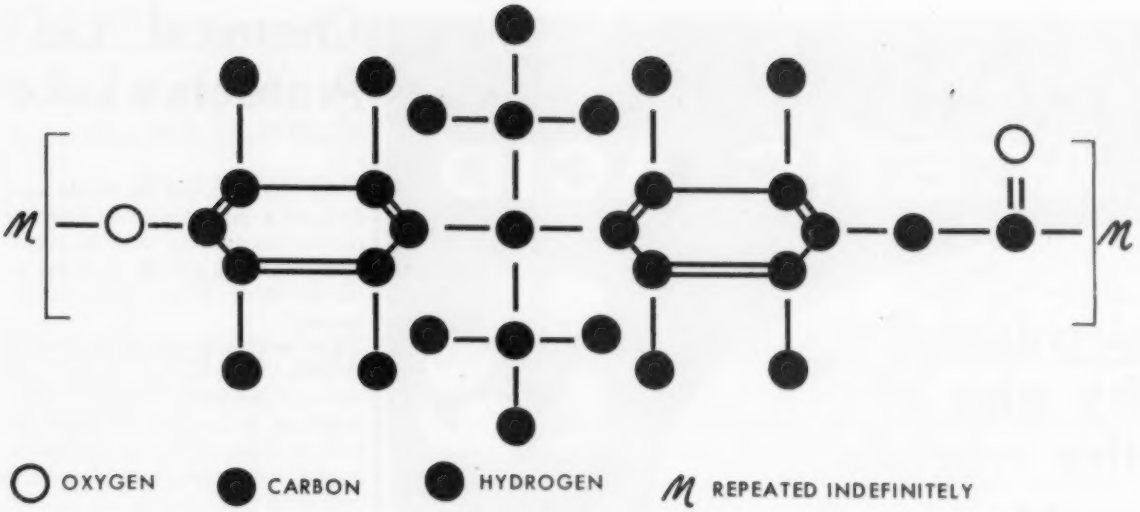


This is the basic structure of a polycarbonate molecule. Researchers in Germany and the U.S.A. think it could father a whole new family of plastics.

A New Plastic Seeks a Market

Digested from BUSINESS WEEK, Apr 6, p99; CHEMICAL WEEK, Apr 6, p96

On both sides of the Atlantic, a new note of excitement has been injected into the plastics industry. Laboratories of Germany's Farbenfabriken Bayer (MD, May, p7) and General Electric Co. of the U.S.A. have quietly been stringing molecules together to form new plastics-type materials called polycarbonates.

Now Bayer has a polycarbonate pilot plant in operation at its Leverkusen works. And GE has reached the point where it can give its material a name—"Lexan."

Broadly, the new material is considered part of the polyester family—the familiar bonding agent in most glass-reinforced plastic laminates. But the polycarbonates possess distinctive properties of their own, hence the industry's excitement. More research and development could add the polycarbonates to the list of plastics as a family by itself.

GE says its material is tough enough to replace metals in many uses. It also resists heat well, holds its shape, has high tensile strength, resists penetration by either gas or water, and has a hard, smooth surface. These, plus "good" electrical properties indicate possible uses of Lexan in electronic and electrical components.

The chemistry of producing polycarbonates is complex, and materials such as Lexan are sure to be too expensive for many uses. But the probable initial price (Lexan is $5.00 per kilogram—none is now available for sale) of the new resin should allow it to compete with die-cast bronze. And as the price drops with large-volume production, other materials may lose ground to the polycarbonates. But the market for the new plastic may not be spectacular at first. It will have to compete with such established materials as Du Pont's Mylar (polyester) in the electrical field and polystyrene, in cases and hardware for appliances.

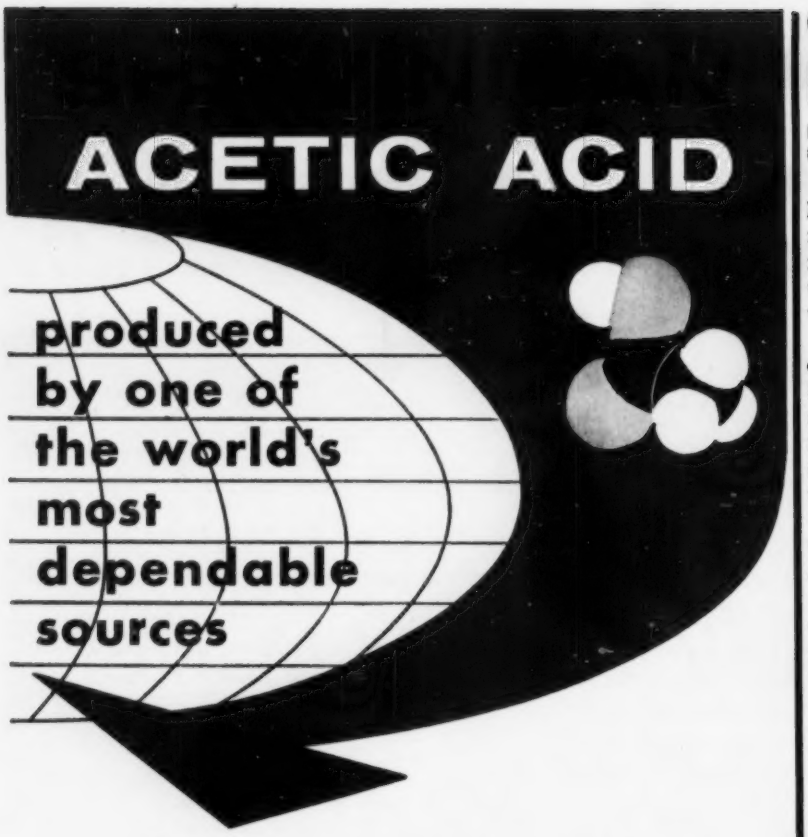
Bayer has made at least 30 polycarbonates. In general, they resemble Lexan in physical characteristics. They can be made with high impact resistance. And they are resistant to just about the same range of chemicals as Lexan.

Researchers at Bayer are trying to relate the physical properties of particular polycarbonates to their chemical composition. A better understanding of the molecular makeup of the polycarbonates would lead to still better plastics.

Both Lexan and Bayer's polycarbonates are a few years from full-scale commercial production. They both also face the problem of finding markets. Of course, any new plastic will have the same problem. The plastics industry today is highly competitive. As each new plastic bursts upon the scene these days, it joins a fight for the market held by earlier arrivals. Unless it is so unusual that it opens up a whole new market, it must forge ahead by displacing an older material.

Yet research must still go on. Producers cannot afford to relax after a new material has wedged its way into industrial use. If the product is to keep pace with the rest of the field, producers must continue research into improved properties and more economical production.

This has been the case with even the most successful of all plastics—nylon—and with all its younger competitors such as polystyrene and polyethylene. It is the situation that faces every new plastic, and the polycarbonates are no exception. About all that any producer can hope to do is to assure himself of a healthy position with a new material that is versatile enough to contend for a given segment of the market. That is undoubtedly what GE and Bayer have in mind. ●



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Chemical "Lid" Protects a Lake

Digested from BUSINESS WEEK, Apr 6, p107

Scientists around the world have long been searching for ways to reduce evaporation loss in water reservoirs. This year it looks as though their efforts will be rewarded.

The need for such a method is obvious. Even though water may be one of the world's most plentiful resources, its supply is not unlimited. And some areas have already reached bottom in exploiting what they have.

Tests in Britain, Australia, and the U.S.A. point to the use of cetyl alcohol as an effective "lid" for reservoirs. Cetyl alcohol, spread over water's surface, forms a monomolecular film that cuts evaporation losses as much as 45%. But before cetyl alcohol, or any other chemical, can be finally accepted, scientists must:

—Find proof that the chemical is not toxic to fish, vegetation, plankton, or algae. (Cetyl alcohol has no toxic effect on humans). British reports indicate that cetyl alcohol does not disturb biological life in the water.

—Find a cheap way to control bacteria attracted to fatty alcohols like cetyl alcohol. Copper salts may be the answer.

—Improvise a practical means of spreading chemical films over large bodies of water. Possibilities include spraying from airplanes, helicopters, or boats.

—Determine how effective the films will be when battered by wind, rain, freezing temperatures. Cetyl alcohol looks promising as a self-repairing film.

—Find out whether the water temperature will rise under such a protective cover—a rise that could alter the water's biological content.

In all these areas, cetyl alcohol looks best, at least according to preliminary studies. From a cost standpoint, cetyl alcohol would be practical for large bodies of water, too. Theoretically, 1 kilogram at a cost of about $1.10 could protect 1.3-million square meters for six weeks. During this time, evaporation losses would be cut 45%. ●

● Once you decide you need a new plant, your problem is finding the right location that will make the plant pay off.

● Site-finding is no job for amateurs. It takes organization, careful planing, and often the advice of outside specialists.

● Know what you want before you start. That is most important in . . .

Finding a Site for that New Plant

Modernization, expansion, decentralization—these are problems of the day for international management. Everywhere, national economies are growing; purchasing power that has been wholly concentrated in a few large cities is spreading out; transport is improving.

Management finds itself asking questions like: Shall we expand our old plant? Or should we build a new one? If so, where?

And for the future, the problem could well assume even wider dimensions. Increasing world trade, and the development of regional economic groupings — Europe's Common Market, a customs union in Central America—may one day give plant location a distinctly international flavor.

Location problems are legion. But the thorniest of all is "Where do I start?"

The first step involves some deep soul searching on management's part. It may sound elementary, but **you have to decide what you need before you can evaluate any site.** Failure to define your needs can be your biggest source of trouble.

Once you have fixed what you want, the really serious business of finding a site begins. There are three basic approaches:

—You can do it yourself, or

—You can call in professional site-seekers — consultants — and turn the job over to them, or

—You can combine the first two by setting up a team composed of some of your staff and outside specialists.

I. Which One for You?

Whichever you choose depends mostly on you and your organization. If a company tries site-finding itself, its management does not always have the experience to cope with the problems that are likely to appear. This can be true even though management knows precisely what it wants. It is still more difficult for a small company to go the "do-it-yourself" road alone. It usually cannot afford to detach members of its management team and send them into the field searching for plant sites.

The consultants will tell you that their chief advantage is their staff of experts that can relieve management of most of the burden of finding a site. The experts take the problem right from the client's conference table and within a limited time come up with several site locations for the client's approval. Further, the consultants are free to operate in a completely unbiased atmosphere. They are not influenced by high-pressure local groups seeking a plant for their area. Nor are they encumbered by pre-conceived notions management may have. Their one job is to find plant sites that meet their client's requirements.

Some of the large, broad-gauged consultants offer plant location as only one part of their wide services to management. Some firms specialize in plant location and nothing more. Some engineering and building consultants will handle site problems. Operations vary. One of the American engineering firms, such as Lockwood Greene Engineers, forms a team made up of its men and members of the client's management. One specialist in plant location alone, Wallace G. Rouse Co., will go as far as buying a site for a client. Rouse claims that it can sometimes save the client substantial amounts of money and time.

Often a consultant will recommend not building a new plant. After he looks over your problem, he may find that what you really need to do is expand your old plant. His recommendations, of course, are always backed with plenty of facts and figures.

There are still other kinds of help available to you. Sources include: local governments, utilities, railroads, port commissions and local Chambers of Commerce. Some supply useful information that can fit significantly into your evaluation plans. Some will even analyze specific sites in relation to your needs if you so request. The Netherlands Industrial Institute, for example, has been particularly successful in bringing new, foreign plants to Holland—and one of the reasons is its highly-organized factory location service.

II. Organize the Search

No matter how you approach the problem of finding a plant site, it will have to be well organized. One way is to set up a special study group consisting of members of your management staff and outside specialists. The outside specialists can be a consultant firm that follows the problem from start to finish or you can have a number of different specialists called in from time to time to advise on particular phases. The mechanics of selecting a plant site are illustrated in the case study beginning on page 26.

III. A Guide List Helps

Most companies make up a list of basic questions which must be

answered and evaluated in terms of the specific new plant needs. The questions cover such areas as: production materials, marketing, transportation, labor, utilities, living conditions, climate, and site characteristics.

This guide list can have as many factors as you can think of, or it can be just the barest outline, pointing the way for more detailed study. The important thing is this: At least you know what you want. You'll find a sample plant-selector guide on page 28.

From the guide list, the study group picks out basic plant requirements (type of products, and number produced, machines, number of employees, power required). The basic plant requirements determine the land area necessary for the plant and its services and still leave room for any expected expansion. The group also estimates the quantity of raw materials and finished goods to be handled.

Other estimates show how much steam, water, and electricity would be needed for processes and auxiliary operations. In effect, these estimates define the size of the plant and the kind of services that will have to be considered for any location.

IV. Large Areas First

By this time, several large general areas can be considered. So the study group next concerns itself with the kind of labor available in each area. One of the things the group has to know is whether the company's possible employees are already trained or will require further training. This may mean quick trips to each area to discuss with local interests the general work characteristics of the people available for employment in the areas under consideration.

Now you can start a preliminary examination of each of the general areas. These are the factors that would bear most heavily in this phase: proximity and costs of raw materials, markets sought or to be served, transportation facilities and costs, availability of fuels, power, process water, local laws, and climate. Generally, one or more of these factors will affect the cost of the new plant's operation more than others. For example, a cotton mill might prefer to locate close to a major market and a good labor area rather than locate near the source of material.

V. Start Eliminations

By now, the group has narrowed down the general areas to perhaps two or three. At this point, it brings in the company's legal advisor. He is given the job of making contacts and asked to advise the group on ways to maintain good public relations. He also becomes responsible for investigating the cost of land, tax liabilities, rights-of-way, and costs of water and power in the general area.

The problem now is to pick the best locations within the remaining general areas. The best locations could include a country's capital city where the major market would most likely be; or it might pay to place some kinds of operations in outlying provinces or political subdivisions. Some locations may be near the source of raw materials; others could offer good labor, power, transportation, but may not be near enough to either markets or raw materials. It is usually a combination of a number of factors that make an area worthy of further study.

VI. Final Selections

From this point on, the tempo of the search quickens. Each member of the study group has his own particular factor to evaluate in each of the possible sites. The information collected is funneled in to the group leader. His job is to decide whether further study of any location is worthwhile. Thus the search narrows until the fewest number of specific sites within each general area remain.

As a final step, the group leader usually prepares a report. The report analyzes and compares the remaining sites and is submitted to management for the final selection. ●

Digested from Ingenieria Internacional Industria, Factory Management & Maintenance, Chemical Week, Chemical Engineering.

Finding a Plant Site In Peru

Finding a plant site can be quite an involved process. The example that follows shows you how it can be done.

Assume that a group of investors in Peru have decided to build a cotton textile plant to manufacture 270,000 meters of print cloth per week for domestic consumption and export. They have already secured rough estimates of the size of the plant required, the cost of the machinery and buildings to be erected. Preliminary investigations assure them that the plant will be a profitable venture. Now they must make a plant-site study.

First the investors study group lists basic plant requirements:

Products—print cloths

Production—270,000 meters per week

Size of plant—10,800 square meters

Major market—probably Lima and export

Machinery—20,000 spindles, 500 looms, and auxiliaries

Electricity — for 2500 horsepower, purchased

Number of employees—200 to 300 (60% female; 40% male)

Housing for employees—for 100 families

Labor laws—for textile industry

Hours of operation—120 to 144 per week

Raw material—38,000 kilograms per week of cotton

Water—fire protection, employees, boilers, slashers

Steam — winter heating and slashers only

Waste disposal—no problem

Fuel—coal or oil

Transportation — railroads and highways connecting Lima with outlying cities.

Using these specifications as a guide, the study group estimates that the plant itself plus a service yard and room for future expansion will require 304,000 square meters. Housing for the employees might add another 101,000 square meters. Thus the group

knows it may need a site with at least 405,000 square meters, with a fairly level terrain and good labor and transportation. It must also have water and electricity available.

After studying population statistics and general information the group selects the Lima area for its market possibilities, Arequipa for its textile industry and trained labor, Ica because of its location in the cotton growing area on a river and highway halfway between Lima and Arequipa.

Members of the group, including the legal advisor and manpower specialist, visit the principal cities in these areas to meet government and municipal officials, development bureau officials, trade associates, and railroad officials. These people furnish information on the desirability of locating a textile plant in their areas.

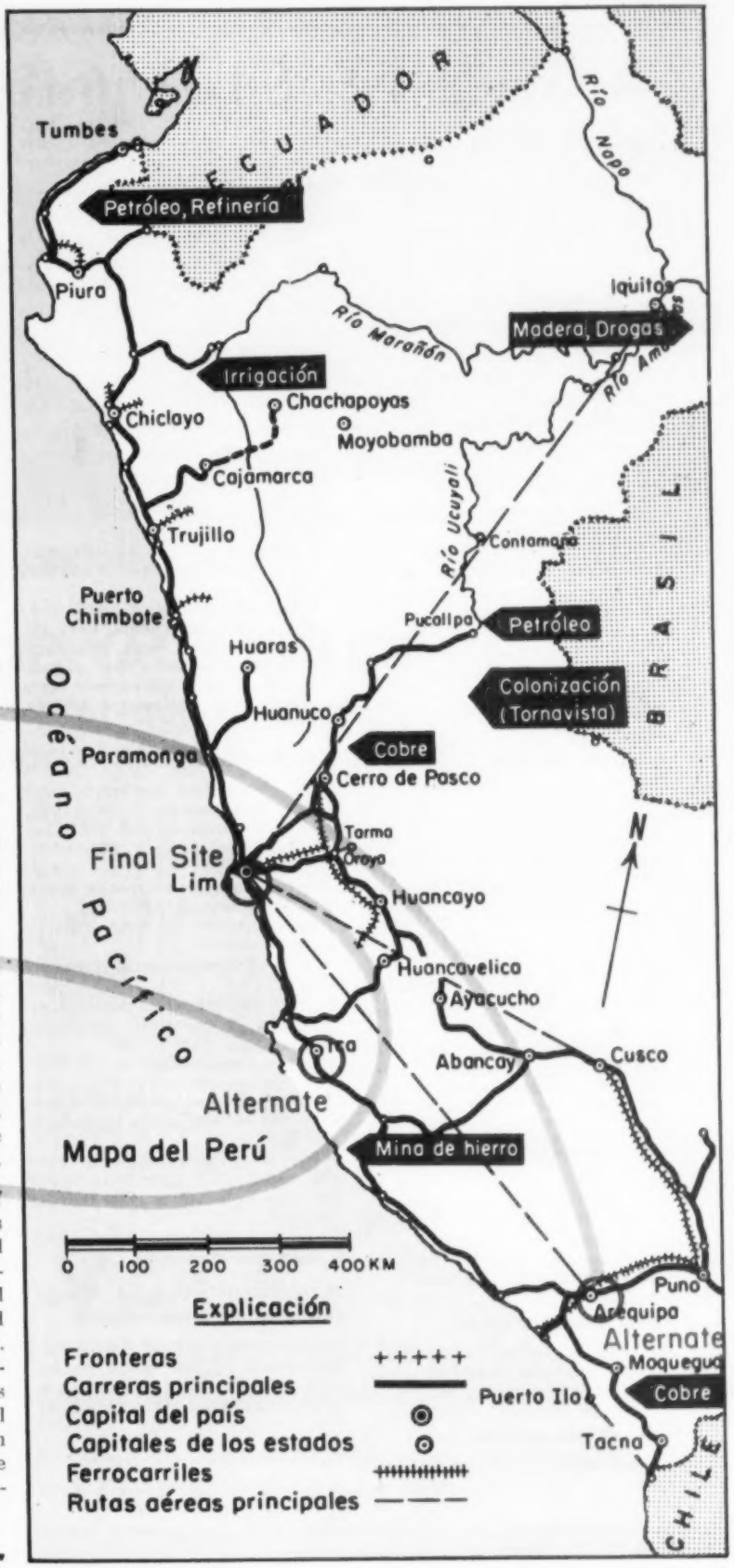
This field trip provides the basis for selecting several general areas for intensive investigation.

AREQUIPA has the advantage of nearness to cotton-growing areas and the probability of finding labor already trained in textile operations. The city also has good transportation and is near the port of Ilo. But its local market is not as large as Lima's.

ICA has an ample supply of good labor, is close to the raw materials and is closer to Lima than Arequipa. At this point Lima appears to have the best potential market. Ica's transportation facilities are not as well developed as Arequipa's. Thus transportation costs are to be high. This eliminates Ica.

LIMA is first choice because of its market. In addition, Lima is the hub of several railroads and highways, has access to the principal port of Callao, and its pool of labor can easily be recruited and trained for textile operations.

The final step is to analyze possible sites near Lima. This calls for intensive investigation of all the factors previously studied in selecting the general areas. The site that meets all the major requirements gets the new plant.



A Guide For Site-Hunters

How to Use It

The guide below is two things: (1) a list of factors that you must consider in selecting any plant site; (2) a simple evaluation plan that you can use to weigh the factors most important to you in making your decisions.

Here's one way to use the guide to define your needs: You can go over the list and put a check mark on every factor you consider important to you. For example: Where you read "Are raw materials sources reliable?" and you think you must have reliable sources nearby, check it.

This is the simplest way to define your needs. Actually, you can develop much more refined methods that will suit your own problems. You can have two or more classes of importance, such as "Imperative" and "Desirable." Or you can go even further and develop a rating scale that lets you weigh the importance of every item.

Once the importance of factors has been determined, you can go over the list to see how an actual site compares with the factors you consider important. On the really critical items, you must have a very good match. Naturally, on items you have not checked as important at all, you do not have to evaluate the site. This is the advantage of setting down your needs first: There's no need to waste time evaluating unimportant factors.

Commercial Services

Does community contain a diversified amount of commercial services required by industry?
Are adequate construction services and facilities available, either in the community or nearby?

Physical Climate

Typical factors: General weather conditions, elevation of community, temperature (annual average, seasonal average, maximum temperature, minimum temperature), precipitation, (average annual rainfall), tendency toward extreme weather conditions. Floods?
Have building costs and plant design been considered as a function of climate?

Specific Site Considerations

Has character of site been thoroughly explored?
Any restrictive covenants, easements or other legal entanglements that would interfere with use of property?

Rail Transportation

Have you studied groupings of major railroad systems to take advantage of natural flow of traffic and to minimize transfers?
Are there adequate truck handling facilities at freight terminals?

Truck Transportation

For truck receipt and shipment operations, have you studied all major factors?

Water Transportation

Is your supply or shipment picture such that water transportation is essential?
Is your product such that proximity to overseas shipping has high priority?
If your proposed new plant is to receive water shipments, have the following factors been considered for alternate sites? Proximity to existing piers, construction costs of new pier, lighterage factors, transit privileges.

Raw Materials

Are needed raw materials close enough? (Especially if perishables, bulky, or low in value). Will they be available, or are they committed to others?
Are raw material sources reliable?
Are the prices satisfactory?
Are terms of sale and delivery right?
Is cost of transport to site reasonable?
Do you see evidence of depletion or shortage of resources (minerals, timber, soil, water, other)?
Are you close enough to key supplies for easy consultation?
Are existing or proposed manufacturers near by whose byproducts you can use?
Where large natural resource areas are needed (such as timber or ores) can they be leased or must they be bought?
Have you attempted to forecast new sources of supply?

Management Potential Within Community Labor Group

Is social, cultural, and economic background of prospective worker such that he can be expected to grow into added responsibilities?
Are specialized skills available?

Labor Stability and History

Is labor force largely transient and disinterested?
Has history of local industrial relations been satisfactory?

Labor Availability

Is community subject to seasonal labor variations?
Does adequate labor pool exist within reasonable radius?

Residential Housing

Are there enough rental properties for new employees?
Will you have to build homes?

Roads and Highways

Does quality of road construction and maintenance indicate an efficient highway department?
Does local highway system have adequate inter-connections with national networks?

Water Supply

Are your proposed and potential water requirements compatible with water resources of proposed area?
Is quality satisfactory from the probable source?
If water treatment is needed, are costs in line with other site locations?

Electric Power

Do electrical characteristics suit your needs?
Is complete rate picture satisfactory to you?

Community Business Climate

Is attitude of local officials sympathetic and enthusiastic toward existing and new industry?
Have you checked with representative local industries regarding their summation of community business climate?

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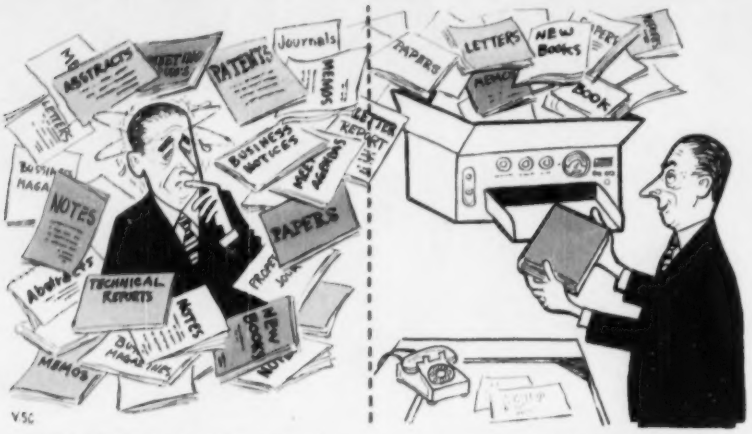

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. . . some sort of organization is imposed on the flow of information. Managers ask . . .

More Information With Less Reading

Technical and management information is growing faster than management men can keep up with it. Every company—large or small—is faced with this problem.

"Digging out information," observes one executive who has attacked the problem, "has become so time-consuming that men are discouraged from the effort."

There are no sure answers to this growing problem—but more and more companies are trying to do something about it. For instance, Esso Research, a subsidiary of Standard Oil of New Jersey, recently set up a new division of Technical and Public Information—with 85 employees—whose sole business is information. Information specialists are being assigned to each research team, and the company's technical men can now go to one central place to get the information they want. The technician will still have to dig out his facts: "We're not going to spoon-feed him with capsule information," Esso told *Petroleum Week*.

Management men have one clear task in common with these oil technicians: Their job is to solve problems. For both, the effective use of recorded knowledge is economically important.

Recent surveys show why company librarians—part-time file clerks or trained professionals—earn their pay. A library science professor asked 100 U.S. corporations in the metals industry how much use their personnel made of the company library. Not just interested in numbers, he correlated the replies with the earnings growth records of the companies over 10 years. The results, reported in *Product Engineering*, were startling in two respects:

—Of the companies that depend primarily on personal reading by management, and little on the library, 67% were in the lowest 20% in earnings record standing.

—Of the companies that depend primarily on the library, and little on personal reading by management, 67% were in the top 30%.

It was found that management men and technicians in the top earning companies spend less of their time searching for or studying technical and scientific information. Instead of searching themselves, successful managers ask the library to supply a written summary of articles or books (and not just a list of references), or they ask for actual articles or books. Management men who made the most use of the library also were less satisfied with library services.

Other surveys show that while most companies depend on a "routing list" for books and magazines, some are trying to take the burden off their harried executives. The British magazine *Business* and the American Management Assn. found similar reading problems among management men, and their findings are probably true around the world. Both show that reading is considered a serious problem in business today.

A British concern, for example, actively discourages routine "route lists." Instead, the library summarizes the contents of all journals received and circulates these; then people who want to read a particular article ask for the journal.

A planning director for an insurance company tells of a similar case: "We have 30 to 35 periodicals coming into our office weekly or monthly—mostly insurance trade journals. I skim through all of them, abstract pertinent articles and news, reproduce and send them weekly to our various offices."

Other companies send memos around calling attention to articles of special interest.

One big reason why more is not being done about easing the burden of executive reading is the tremendous range in business needs, personal interest, intellectual curiosity, inclination to read. There is no such thing as the average business reader.

Many businessmen read advertising pages as avidly as they do editorial articles—and abstracting would cut off this wealth of business information.

The AMA survey turned up the significant fact that some businessmen read up to 40 business books last year, others read none. This range outweighs all the findings about "average reading time."

Averages, however, do show some clear-cut differences. Top managers, for instance, spend much more time on general newspapers and business magazines then do middle managers. They feel they must keep in closer touch with current events, both political and economic. They read more reports, too, but middle managers spend more time on correspondence. Production men, on the other hand,

read less than sales executives or general management.

Of course, management men also read non-business books: Most seem to prefer fact books—current events, history, biography. But television is cutting into the outside reading time of executives, and this "distraction" is rapidly spreading.

No one, of course, can say how much time a businessman should put into reading, or what he should read. Some executives are troubled because they cannot spend more time on broad, cultural subjects.

As for complaints, almost all businessmen say some of their reading time is wasted. They blame it overwhelmingly on wordy, repetitious, or poorly-organized material. In one survey, four out of five respondents said they read only for highlights to save time. This trend has not been lost on the editors of business journals. Some magazines, particularly U. S. business journals, are experimenting with "variable speed" reading—with devices such as popping up the main ideas in bold face type. And business digests become increasingly popular.

More executives are also going back to school to learn how to read faster. Not all who have taken fast-reading courses are enthusiastic; but the fact is that most businessmen read at the same speed as a 13-year-old schoolchild—about 250 words a minute. A reading expert told the *Wall Street Journal* that an executive should read its news columns at 550 words a minute, and ordinary desk correspondence only a little slower. For this reason, reading instruction is on its way to becoming an accepted area of management training.

The executive reader can be helped by reading courses and better library research services. But in the end, he is on his own when it comes to day-by-day personal reading. He reads in direct proportion to his time, inclination, and need. And that makes reading a difficult problem to deal with. ●

Digested from: The Management Review, Jan, p60, March, p84; Harvard Business Review, March-April, p147; Business, March, p116; Wall Street Journal, Jan9; Factory, Dec, p96; Petroleum Week, Dec28, p26, March 1, p24; Product Engineering, Dec, p149, March, p167

Starting a Company Library . . .

. . . involves more planning than money—the investment can be as large as you want.

Usually the best organized libraries are in research laboratories, and experience in this field—as collected by the Science-Technology Division of the U. S. A.'s Special Libraries Assn. —suggests a minimum of approximately $10,000 for a "small library service" in a limited technical field. That would include books, equipment, periodicals and incidentals—but not salaries or overhead. A full-time librarian and one assistant would probably be required. After it is started, the library would grow on an annual budget of $3000—excluding salaries. (Research libraries average one staff member for each 20 to 30 researchers.

On a smaller scale, a company can start a library for the cost of magazine subscriptions and essential reference books. A small library requires little attention; but as it grows, the administration grows much faster than the book shelves. The material must be indexed. A checking system is needed to keep track of who has what book. Book lists and subscriptions must be kept up.

If possible, get the advice of a trained librarian. He (or probably she) can choose the best indexing system for the size of the library, help to select equipment and locate bibliographies. Most important, he can help train the company librarian.

Experienced librarians are hard to find. Some countries have library associations that can be of great help. In other places, a good plan might be to go to the best library available and ask the advice of the librarian in charge.

And do not forget that too much "red tape" can turn the library into a bureaucracy.

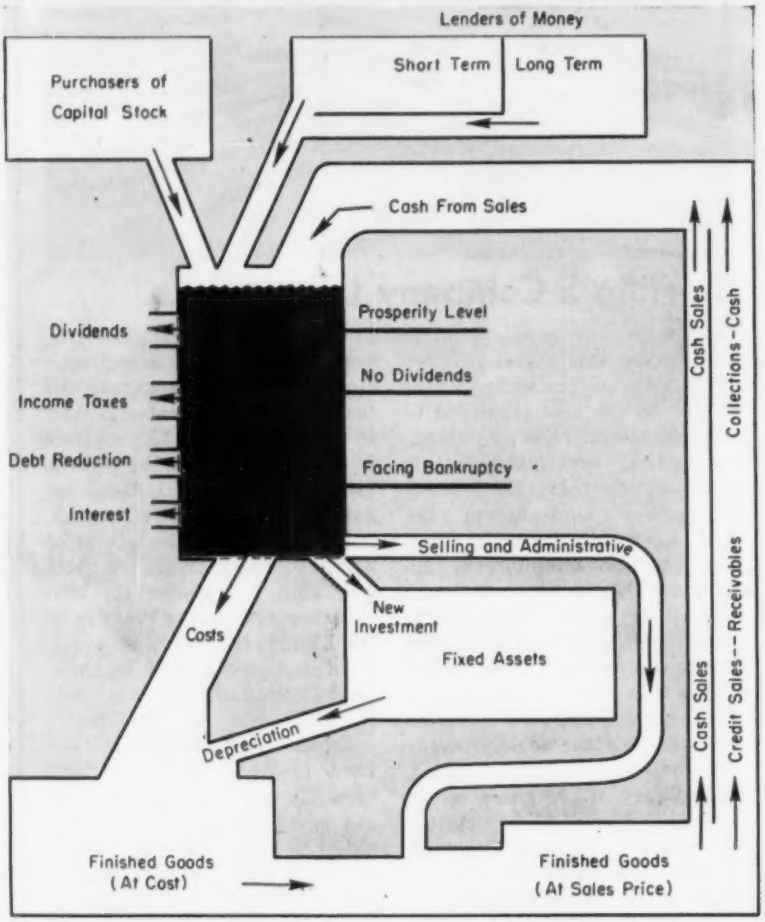
In Small or Large Companies . . .

. . . the library proves its worth. For Ohio Oil Company's new $200,000 research library (picture above), a professional librarian, after interviewing the researchers, collected 3,800 books and 6,000 miscellaneous items in six months. That included subscriptions to 110 publications—ranging a price from $3 to $350 (for technical abstracts) a year —complete sets of technical papers and magazines—$17,000 worth—and private libraries.

The scientists do their own searching, but their job is made as easy as possible. The latest aid is microfilm equipment.

Smaller companies can take a lead from New Britain Machine Company of the U.S.A., which set up a 100-magazine library in one cubic meter of space in a supply room. A file clerk spends an hour or two a day as part-time librarian. He keeps a card index of what is in his library, and he can locate an article quickly by author, title, or magazine. A question beginning, "I saw an article somewhere a year ago," is usually easy for him. If his memory fails, he goes to the standard references indexes such as Industrial Arts Index, and he uses the public library.

How Cash Flows Through a Business



The flow of cash is the concern of management at all levels. Diagrams are useful in explaining the mystery of financial control to operating managers, whose reports provide . . .

Data for Decisions

"Finance" and "cash flow" are slightly mysterious phrases outside the realm of treasurers, controllers, and high-ranking executives. Many lower and middle managers—and businessmen in general—are likely to look at the diagram above and say, "Very interesting. But what does it have to do with me?"

The answer, in brief, goes something like this: "The flow of cash in a business is not automatic. It is controlled by management decisions. And while financial planning starts at the top and goes down the chain of command, financial control (or call it budget control, or management accounting) falls heaviest on first-line managers and moves—with decreasing importance—up the management line."

Top management, ever searching for ways of cutting costs, is giving active support to making business finance more meaningful to operating managers. Several hundred executives from all over the U. S. A. recently gathered in New York for three days to discuss just this problem—"Data for Decision." The American Management Association planned the sessions, with an emphasis on management accounting and reports that "communicate information which management can understand and use—to make its decisions." The use of cash flow diagrams (left) was one of the practical ideas the executives took home with them.

Management accounting is a partnership, aimed at definite company objectives, and not just a flow of historical or critical reports to somebody "upstairs." A knowledge of how a business works gives more meaning to a financial control system—all the way down to the daily reporting of material, manpower, machines.

The diagram was devised at the Amos Tuck School of Business Administration, Dartmouth College, (U. S. A.) as a teaching aid. It is based on information that is usually readily available in most companies. Its value is to make it easier to visualize cash flow, which is compared to a liquid flowing in and out of a reservoir.

As a general outline, it is important to point out that cash coming from the outside—borrowed, and from capital investments—goes into fixed assets and to pay for raw materials, wages and salaries. Cash flowing through the business leaves "deposits" of plant, equipment, and goods.

When goods are sold, the cash returns to the reservoir; and this return must be greater than the cash outflow for costs. The increase in value of goods is shown by a widening of the channel before the point of sale. Cash sales replenish the reservoir directly; there is a delay for receivables. Depreciation is viewed as a cost.

The cash flow is dynamic, of course. This dynamism can be shown by diagraming the cash flow for a company at, say, 10-year intervals—with relationships drawn to scale. For a growing company, these diagrams would show how the cash reservoir, assets and dividends expand.

The more the operating manager understands financial control the better, and studying cash-flow diagrams shows a willingness to "concede" the accountant's contribution to business success. Managers should also be instructed in the company's account-

MANAGEMENT METHODS continues on page 41

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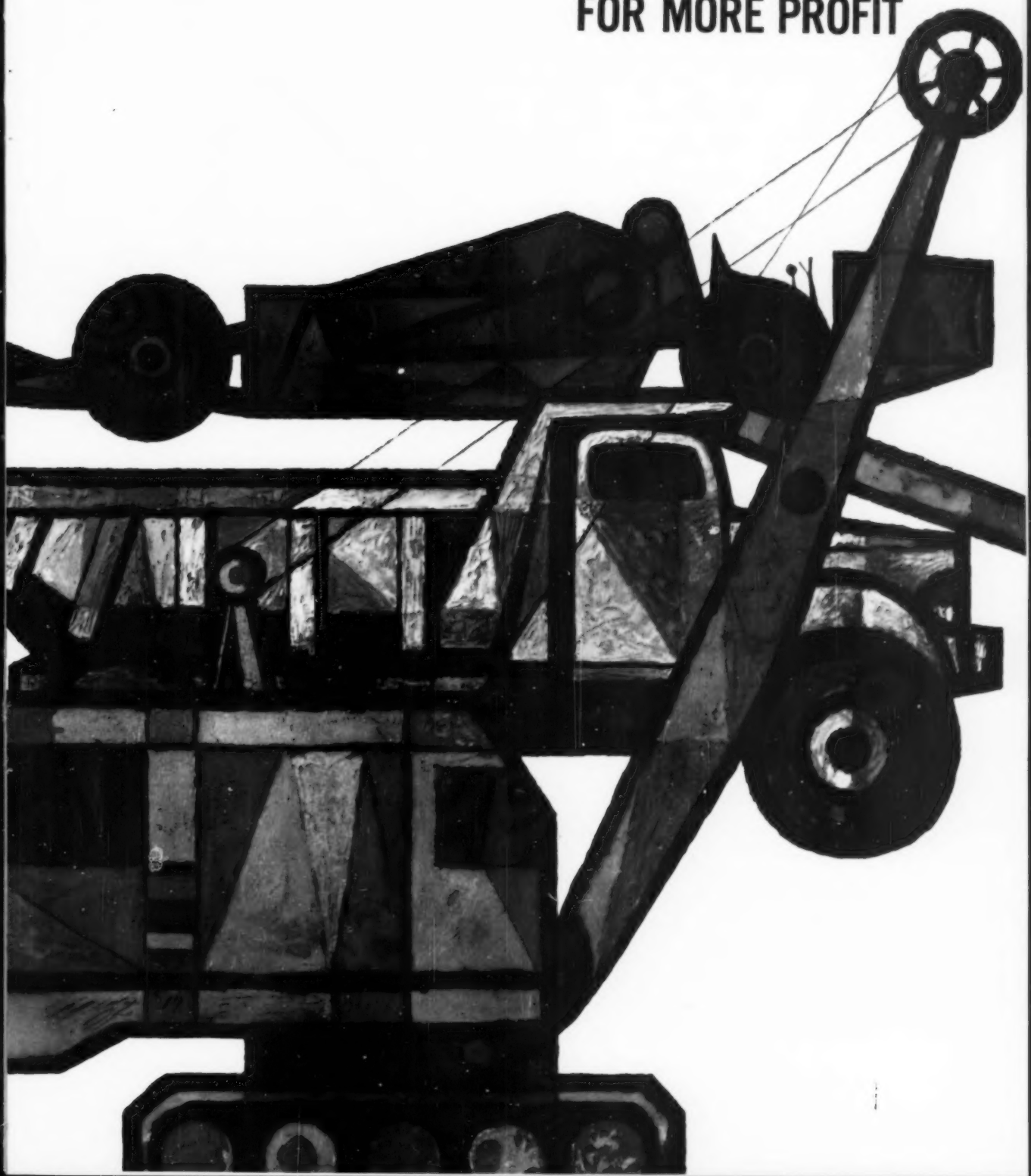

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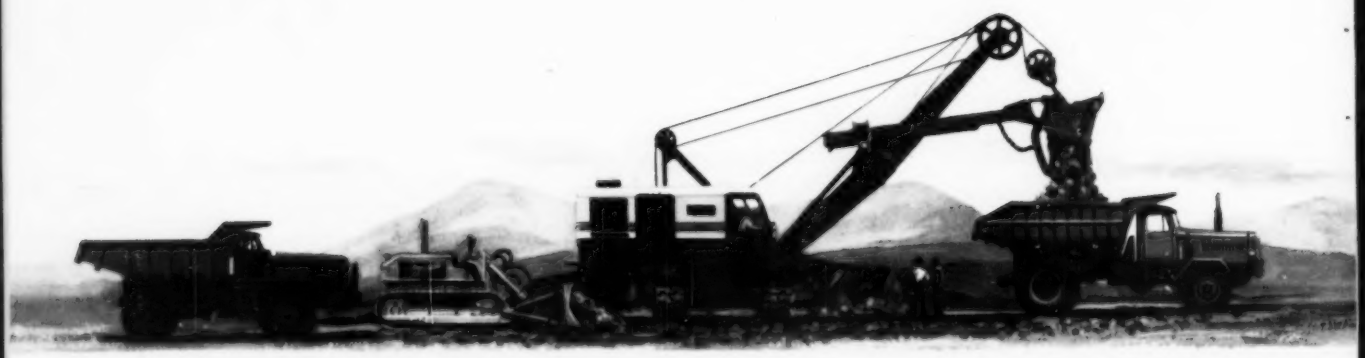

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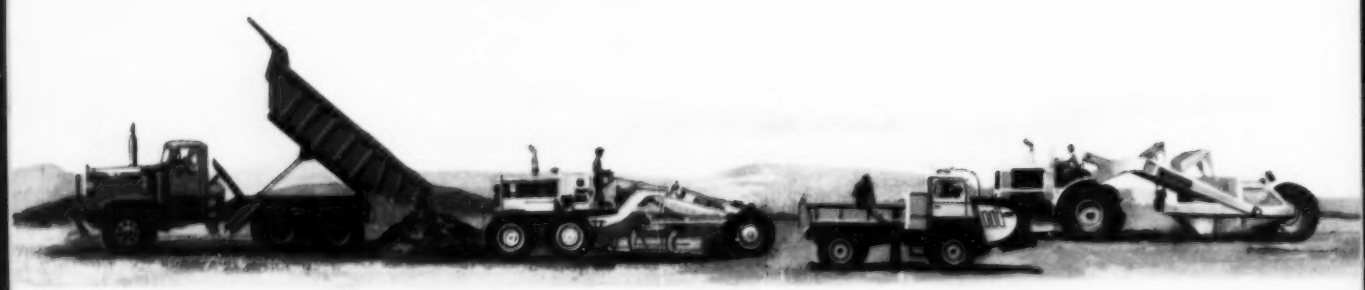
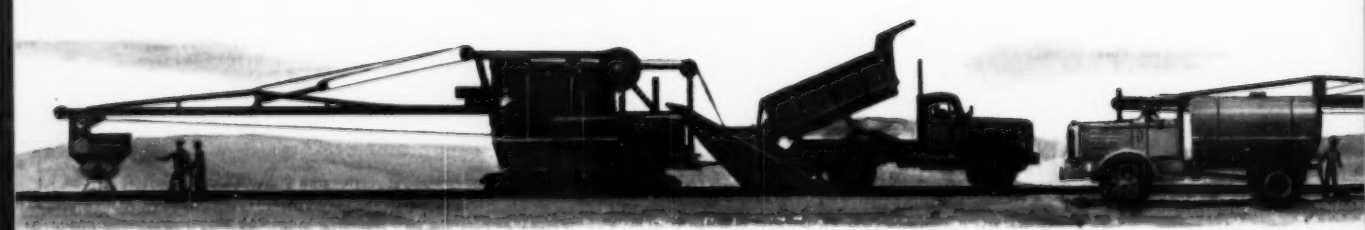


MACK off-highway ADAMS WALTER WOOLDRIDGE



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The pieces of equipment shown on this and the following pages use Cummins Diesels as standard or optional power. Complete details on the over 300 models offered with Cummins Diesels are available at your nearest equipment dealer or your Cummins Distributor.

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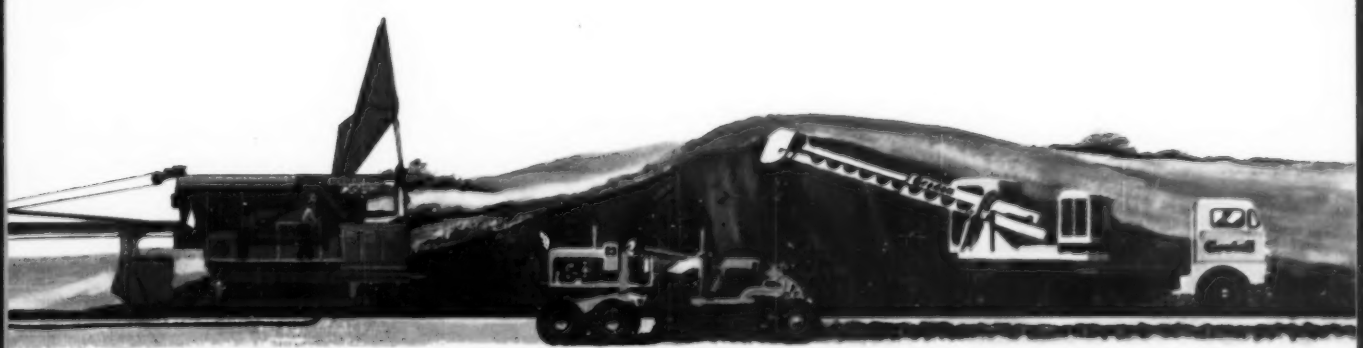

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*recent addition to the list of manufacturers offering Cummins Diesels

specify your power for more profit on waterways and dams!

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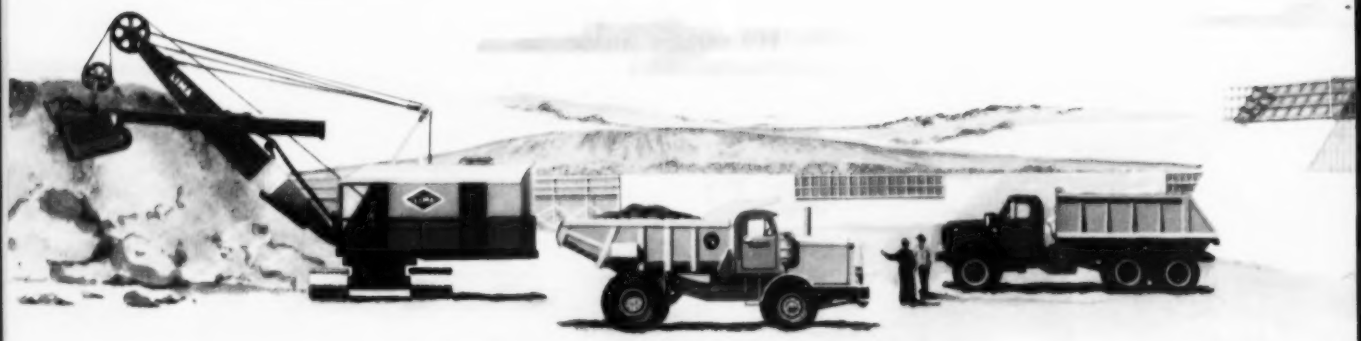

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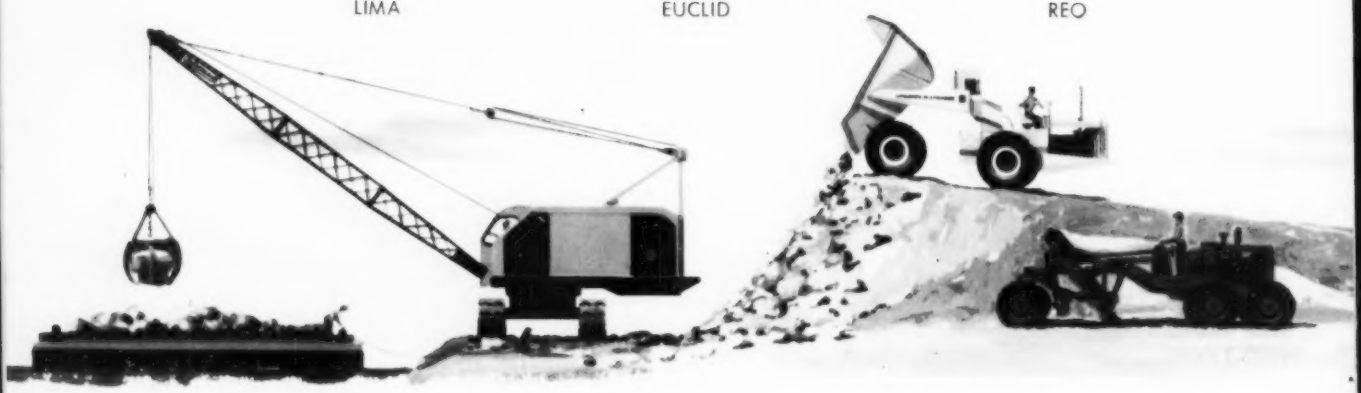

AMERICAN LE TOURNEAU-WESTINGHOUSE GALION

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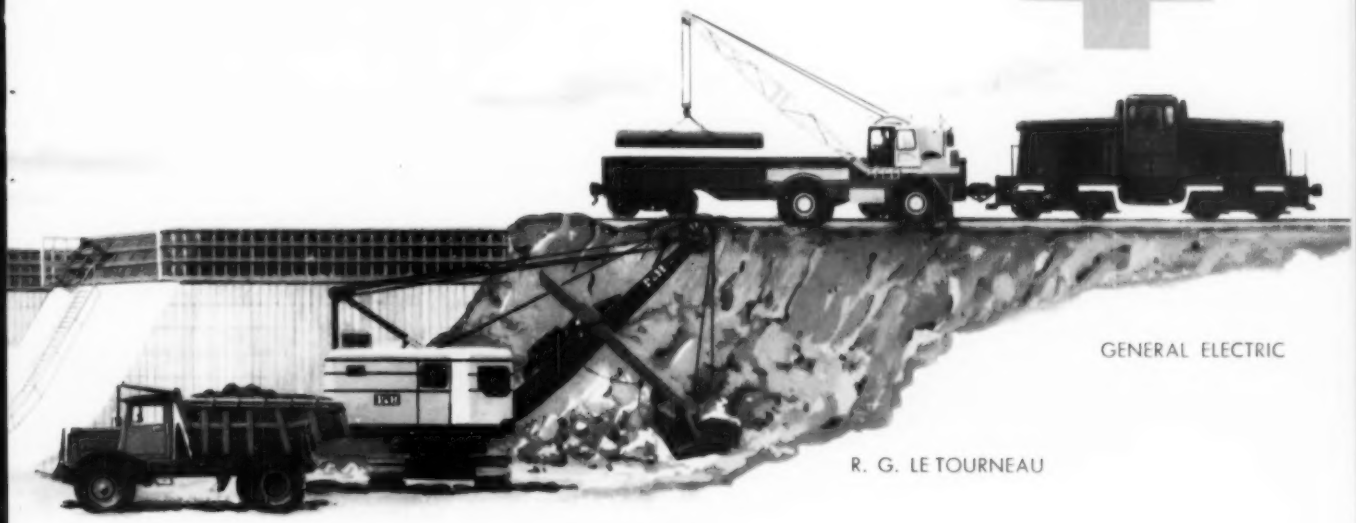
CUMMINS

MORE PROFIT



GENERAL ELECTRIC

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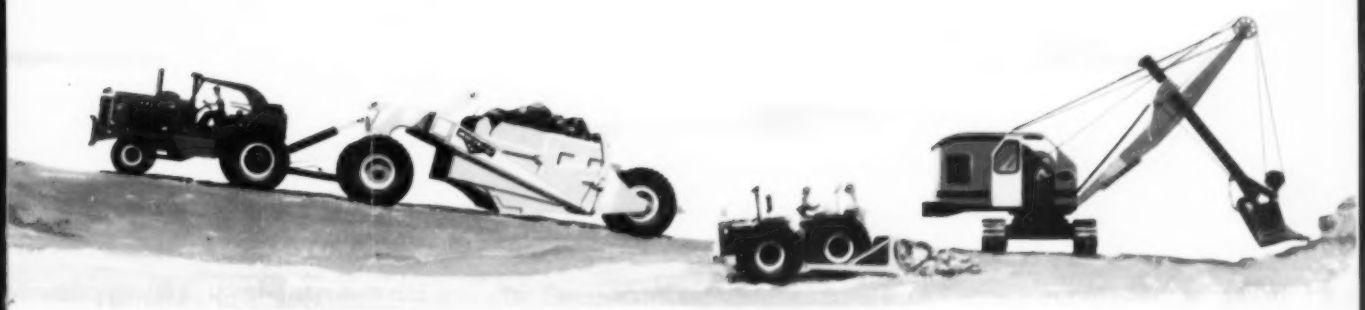
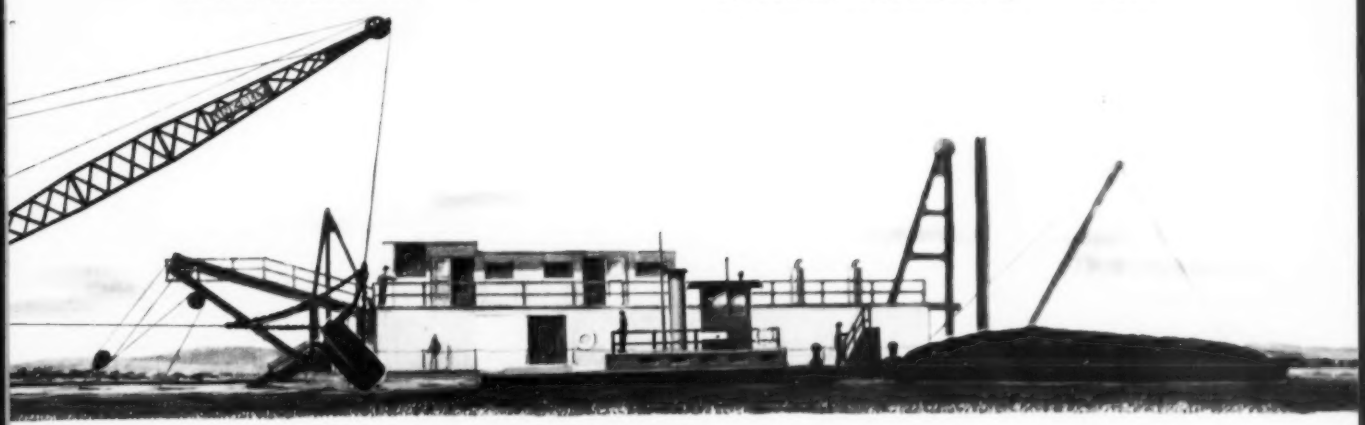


M • R • S - WOOLDRIDGE

LE TOURNEAU-WESTINGHOUSE

INSLEY



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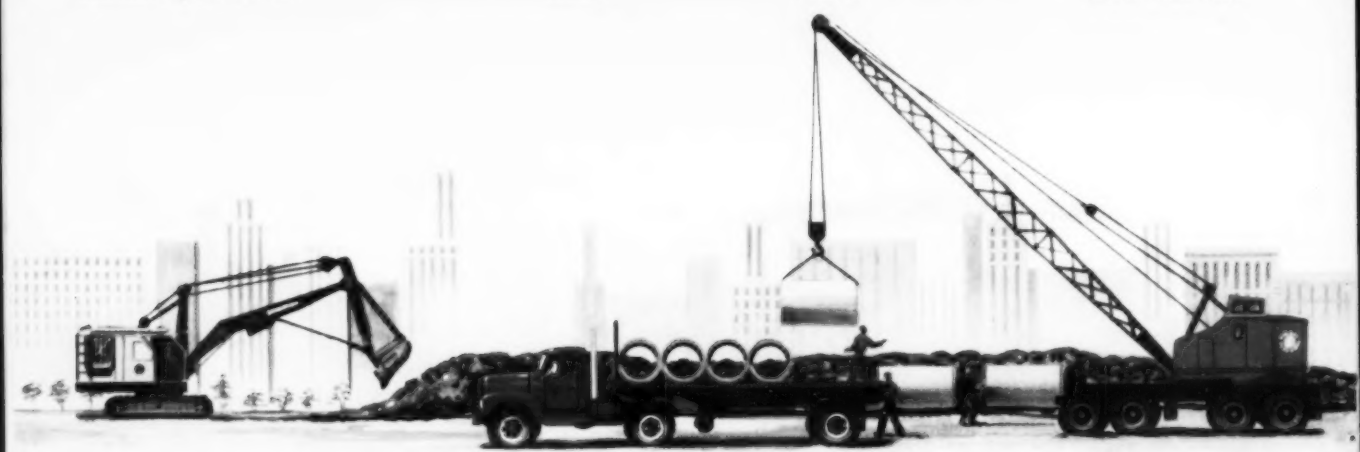

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ing system and the need for accurate reports—weight slips, time records, production reports.

But when it comes to setting up a reporting system, the concessions must come from the accountant. The primary purpose of management accounting is to aid management in making decisions. That is a first principle.

Management's task is to understand accounting reports, not to prepare them. For that reason, it is important to have accountants who understand the company's operations.

A vital point that sometimes goes against the accounting mind: Timeliness is more important to management than extreme accuracy. Reliable estimates of net profits for the previous month are usually prepared by the fifth day of the month, and in some cases, on the first day of the month. The key to quick but reliable estimates is the careful separation of fixed and variable costs, and the use of standard cost factors.

The trend is to a minimum of routine reporting, based on "reporting by exception." If plans are well conceived, only the variations are important—plus the reasons for the variations, and a plan for correction. A "percentage of budget" figure is more valuable information than total production.

There are, of course, different time schedules for reports. Foremen are concerned with day-to-day operations; superintendents, week to week; vice presidents, monthly and trends. As reports go up the chain of command, they become broader, but more concise. The purpose of reports is to measure performance against targets.

There is also an increasing interest in charts, graphs, and all kinds of simplified ways to make figures more meaningful, and reports more readable.

But remember, there is no single best way to report financial and operating data. Some managers are figure-minded, others are chart-minded. Some like oral, group reports; others prefer to study written reports. It depends on the company organization, the products, the management—and the preference of management is by far the most important consideration. ●

To Operate, Delegate

Why don't managers delegate more authority? "Lack of time" is one answer—but there's much more to it.

Digested from BUSINESS WEEK, Apr 6, p175; PETROLEUM WEEK, Mar 29, p33

Delegating authority is one of the basic laws of good management, and there are few management men who will take issue with it as an operating principle. But, in practice, this basic principle is often neglected. Many companies have tried to find out why, and to do something about it.

There are many reasons why more delegating is not done. But the most frequent seems to be that executives are too busy—or say they are too busy. One company that studied the problem got this answer; but, on going deeper, it discovered executives were spending about 85% of their time doing the same work as their subordinates.

They didn't have time to supervise or to develop their subordinates, because they were too involved in grinding out the work themselves.

Work has to be gotten out, to be sure. But one of the biggest problems in business today is that managers, from the top on down, do not know how to organize their work day—to organize it not for work itself, but for responsibility. The function of management, above all else, is the exercise of responsibility.

Small businessmen have more in common with managers in "big business" than they sometimes think—especially in the problem of organizing their work. The trend in giant corporations is to loosen the apron strings from headquarters and let divisions operate as autonomous units. True, these divisions often become large, but they do fulfill the need for more "manageable" units.

Division managers are finding out what it is like to run a company. As in a small business, delegating authority is one of their biggest problems—or, as the problem more often actually presents itself, training a replacement.

One of the most recent converts to autonomous units is the Burroughs Corp., a U. S. manufacturer of office machines. Why? "Today you can't buy management men, you've got to breed them," a top Burroughs executive told *Business Week.* Burroughs is turning away from direct-line administration—in which the top officials directed day-by-day operations of the entire company. Development of new products and new managers was too slow under direct-line management.

Here are the first reactions to the autonomous control:

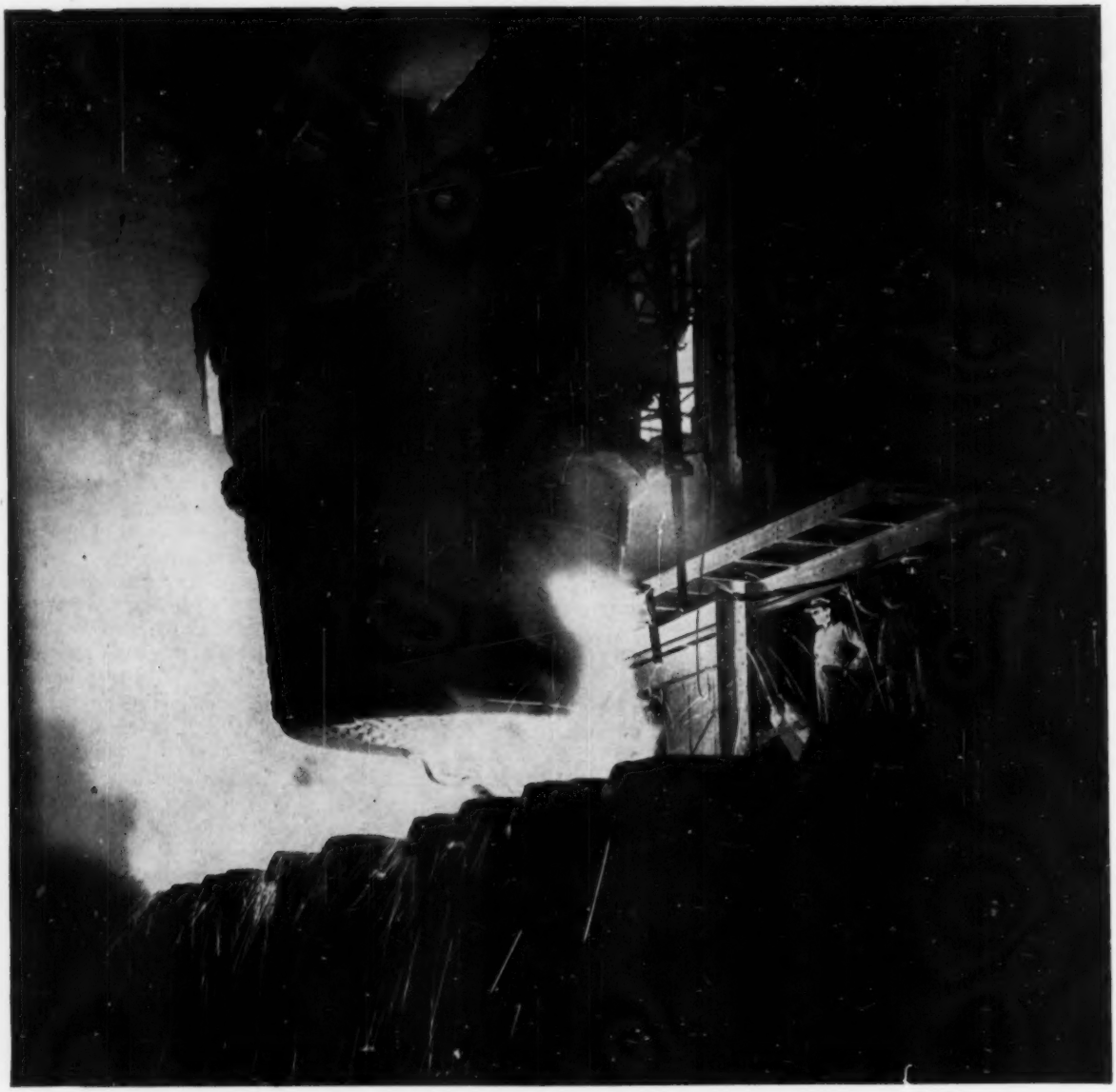
From the company president: "The hardest thing to learn is not to interfere with the divisions."

From a division manager: "We've been given such freedom from control that sometimes we're scared about what we are doing on our own." That is a familiar feeling to the small businessman.

The specialist, Burroughs thinks, needs access to the broad panorama of management — finance, marketing, manufacturing, and engineering. And he gets it in autonomous divisions. The managers who actually make and sell Burroughs products now have to make major decisions; before, someone at "headquarters" made all the decisions. Headquarters manufacturing and marketing men have been transferred to a staff, rather than a line, capacity —responsible only for overall company policies and planning.

Top division men at Burroughs cannot move into the higher echelon of the corporation until they have trained a successor. Training subordinates has become a real criterion of management.

This responsibility to train a replacement also turned up as the clearest conclusion of a recent survey of management development practices in the oil industry by *Petroleum Week.* In fact, one department head said, "I would go so far as to say a man has failed if he doesn't train his replacement to be nearly 25% better



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then he is." That goal is not likely to gain wide popularity, but it shows the emphasis progressive managers put on this responsibility of delegating authority.

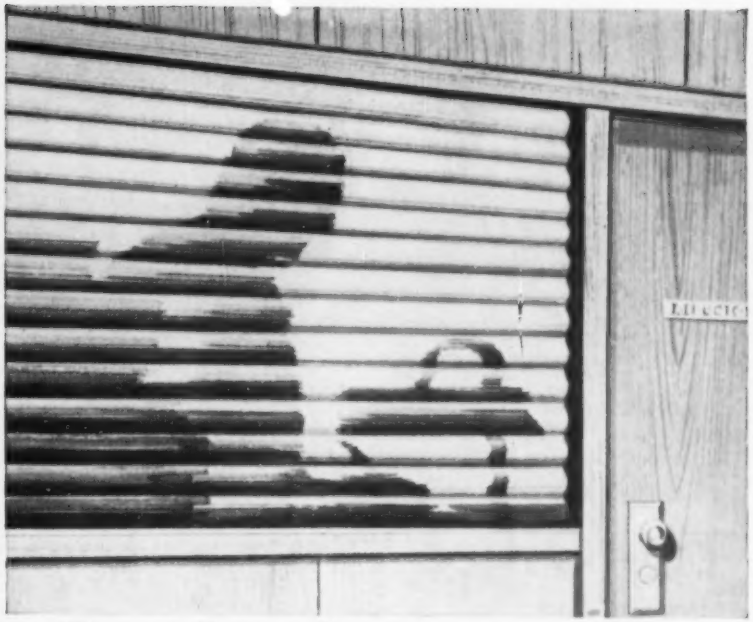
There was an almost unanimous feeling among the oil men that a man develops best by solving real problems—under the eye of a superior who can offer a good example, and good advice when it is needed. The results echoed the reply of one man who said, "The only way I ever learned how to do anything was to get in over my head and have to get out. All I needed was someone to keep me from drowning."

Another man put it this way: "I have never understood how you can 'train' a man to be a manager. You can only provide opportunities for him to develop himself." In brief, for a man to become a good manager, he must be given the chance to make decisions.

In the final analysis, there is as much management development, as much supervision and on-the-job help, as the top man on the job insists on having. If he is "too busy," usually nobody has time.

Here are some suggestions for developing a capable understudy, according to a report in *The Office*:

1. Keep your assistant posted on your plans and progress of these plans so he can make intelligent decisions in your absence.
2. Encourage him in the habit of giving you frequent progress reports on assignments, problems.
3. Give him practice in thinking for himself. Ask his opinion often.
4. Place responsibility on him gradually. Add new responsibilities one at a time; allow time for him to get the "feel of the job."
5. Build up his feeling of responsibility. Give him complete responsibility for certain parts of the work. Let him use his own methods, if adequate for the job.
6. Hold him accountable for his responsibilities, and check on him.
7. Make him feel free to ask for new responsibilities as fast as he thinks he can carry them.
8. Back him up. Consider his orders as important as your own. Do not criticize him in public.
9. Teach him to admit his mistakes promptly. Treat his mistakes fairly, but don't let him "pass the buck" to subordinates. ●



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We, too are for sound decisions. Please send booklet on the new Remington "Foremost" to:

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The Office With a "Lived-in" Look

Digested from BUSINESS WEEK, Mar 30, p172

SMALL ROUND TABLE with no drawers and a "conversation area" in back is the office of Simmons Co.'s president. Small meetings are also held here.

REGENCY furnishings in the office of Hoving Corp.'s president reflect the elegance of the company's famous U. S. stores, Tiffany and Bonwit Teller.

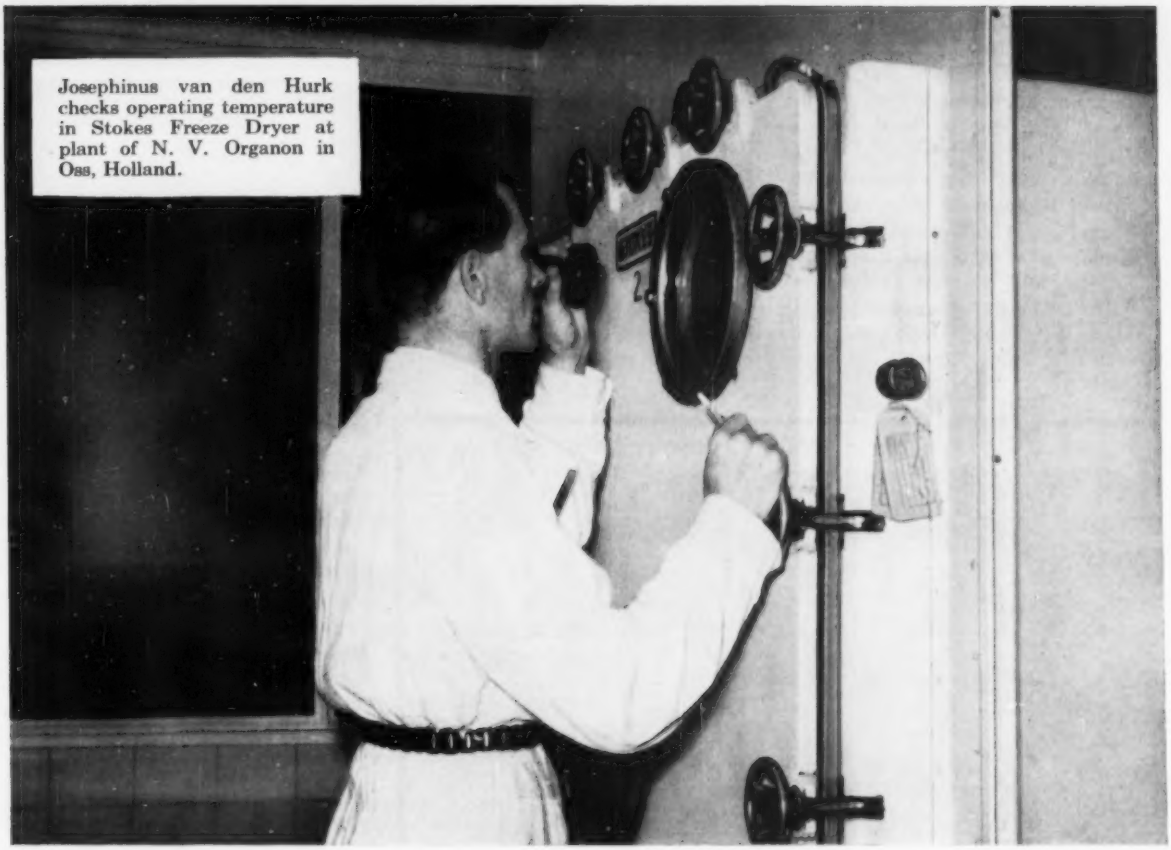
The executive who is getting tired of working in a lustreless atmosphere can take heart from the office above. It bears little resemblance to the typical executive's office of a few years ago.

The desk is a slab of ebony on stainless steel legs. The floor is green marble. On the neat rug there is an uncluttered arrangement of couch and leather chairs. A television set is built into one of the walnut-panelled walls. And on another wall a piece of modern sculpture reaches to the ceiling.

Such office showplaces demonstrate that industry is becoming more aware that the comfort and efficiency of executives go together, and that the office makes a lasting impression on visitors. Executives are realizing that they do a lot of living in the office.

Most of the new offices are done by professional designers. These designers have one goal in common—to design a sanctum for the executive in a style befitting his personality and budget. One rich oil man, for instance, has a glittering, modern office in Texas, and a conservative Georgian office in New York. Most of the new offices look much like living rooms.

Since the modern executive does little writing—he spends most of his time dictating, reading, and conferring—the center of attention is shifting from the desk to a "conversational area" with sofa,



Josephinus van den Hurk checks operating temperature in Stokes Freeze Dryer at plant of N. V. Organon in Oss, Holland.

Continuous Service . . .
Hallmark of STOKES Dependability

Two Stokes Vacuum Freeze Dryers have been in production almost continuously since their installation at the plant of N. V. Organon in Oss, Holland . . . well known manufacturer of pharmaceuticals. One has been in operation since 1953, the other since 1955. They are used for the drying of bulk liquids in trays, and materials in vials and other containers.

According to Dr. P. F. Prinsen Geerligs, service disruptions with the Stokes equipment have been practically non-existent and his company has now purchased an additional, and larger, unit.

Stokes Freeze Dryers are used throughout the world . . . for preserving blood plasma, vaccines, antibiotics, foods, and many other perishable materials. Many models and sizes are available . . . including those with complete, integrated vacuum pumping systems, refrigeration apparatus, controls and accessories . . . suitable for commercial production as well as for laboratory investigations.

As in the case of Organon, many manufacturers throughout the world profit by Stokes' unparalleled experience in serving industry as designers and builders of industrial machinery and process equipment. Stokes offers a diversified line of precision-engineered, cost-saving production equipment . . . including Vacuum Furnaces, Systems and Pumps; Chemical Process Equipment; Powder Metal Compacting and Plastic Molding Presses; Pharmaceutical Tabletting Machines and Accessories. Stokes also offers extensive research laboratory and customer advisory facilities. Your inquiry is invited.

International Division
F. J. STOKES CORPORATION
5542 Tabor Road, Philadelphia 20, Pa., U.S.A.

STOKES

armchairs, and coffee table.

Desk shapes take the fancy of the executive—small and round, J-shapes, L-shapes, kidney-shapes, horseshoe, amoeba-like, modernized rectangulars. The desks usually have few drawers—papers are kept in out-of-the-way file cabinets. Some executives have dispensed with a desk altogether.

Files and storage shelves are built into walls or hidden behind panelling. Desk and floor lamps are giving way to rheostat-controlled indirect lighting.

Board rooms and reception rooms, too, are being designed to catch the company's personality.

Designers argue that a personally designed office need cost no more than a "hodge-podge" of standard furniture. The average custom-designed office in New York costs about $100 per square meter. Some run much less. And if management wants to indulge whims, there is no limit except restraint by the stockholders. ●

Photo by courtesy of Messrs. Rubery Owen & Co. Ltd.

The BITTERN

3-Brush Scarifying machine in action removing *impacted* grease from a factory floor

THE BITTERN SCARIFYING MACHINE

Designed & Manufactured by

Cimex-Fraser Tuson Ltd.

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In Management

● **ONE-MINUTE PHOTOGRAPHS are attached to shipping orders** when outgoing materials are loaded at Kaiser Aluminum & Chemical Corporation, Newark, Ohio (U. S. A.). The customer can thus see the condition of the shipment when it was loaded, and Kaiser keeps a record for possible damage claims after shipment. Total cost per carload: about $1.50 for film and flashbulbs. The Polaroid camera costs about $135. (*Factory, April, p*121)

● **MANAGEMENT EDUCATION continues to be a prime concern** of world business. A new school for business executives has opened in Switzerland—the L'Institut pour l'Etude des Methodes de Direction d'Entreprise at Belle Rive, Vaud. It is modeled on the Harvard (U. S. A.) School of Business Administration. . . . **An Asian Productivity Center** will be set up in Tokyo next fall. It will promote the exchange of productivity information, and encourage education, conferences, and research on business problems common to Asian countries. . . . Some **200 engineers from India** will receive a year's on-the-job training in U. S. steel mills, with academic work on the side, under a $1.5-million grant from the Ford Foundation. . . . **An independent association of management consultants** has been formed to offer Operations Research services to business on an international basis. Headquarters of International Management Consulting Associates will be at 50 Broadway, New York, with affiliates and correspondents around the world.

▶ YOU AND YOUR PERSONAL AFFAIRS

Compared to the plumed female, the well-dressed businessman is a colorless bird. But male fashions are not static. The trend in business suits is towards a middle ground between the conservative European, the brighter American.

London's Savile Row, considered by some the center of male haute couture, clings to its ultraconservative modes—plain, dark colors are still de rigeur. Look at factory-made clothes, though, and you will see the cross-currents. British men are asking for lightweight mixtures of wool and Terylene (Dacron), and you will begin to see more of these fabrics coming from Britain. They have outstanding shape-keeping properties, for one thing.

More attention is being paid to tropical weight suits, with light tones of silver, blue-gray, and medium blue. Perhaps the clearest sign of change in Britain are the shadow stripes and light textural effects appearing in the standard darker worsteds of 15 to 18 ounces per yard.

"Town and country" suits also show a trend away from charcoal gray. Colors are brighter; and current fashion calls for contrasting waistcoat with a single-breasted, two-button suit. The "silhouette" is slim. In casual wear, tweed jackets are revived with yoked shoulders and belted backs.

In New York, this summer's worsteds are usually lightweight—down to 8 to 10 ounces per yard. There are more solid colors and darker shades this year. Casual jackets are mostly in solid colors, too—American executives, apparently, are dressing more conservatively in the office or country, the British a little less.

Of greatest interest are the "wash-and-wear" suits, usually synthetics, or blends of synthetics and cotton, mohair, or rayon. These are brighter and lighter than the worsteds, and are especially popular with the traveling man. Wash them and let dry overnight, then wear them the next day.

A new fabric this year is a combination of Irish linen and Dacron (Terylene). It is washable, needs little pressing.

American cuts are less stringent than British cuts, but the silhouette is definitely trim, if not slim. Suits are all single-breasted and three-button, worn without waistcoat.

Incidentally, you will want to keep an eye on the Italians. They are weaving exciting raw silk and silk-combinations.

•

Where are the most expensive places in the world for businessmen to live?

Exact comparisons are hard to find—costs depend on which version of the old adage you prefer: "When in Rome," do you "do as the Romans do," or do you live just as you do at home? A comparative scale widely used by U. S. companies for allowance purposes ranks the most expensive places (excluding housing) on an index scale where Washington, D. C., stands at 100.

Here's how it breaks down: Phnom Penh, Cambodia, 167.8; Vientiane, Laos, 165.4; Caracas, 162.6; Dakar, 133.4; Istanbul, 131.7; Kuwait, 129.9; Havana, 129.2; Bogor, Indonesia, 125.8; Leopoldville, 125.4; Rangoon, 123.0.

In contrast, Paris rates 115.2; Rome, 107.5; London, 98.2; Tokyo, 91.6. The cheapest place to live seems to be La Paz, Bolivia, with a rating of 57.8.

AAF Air Filters Save Plant Thousands of Dollars Yearly

CLEAN AIR ELIMINATES PRODUCTS DISCOLORATION. Dust is a costly nightmare wherever quality control of a finished product is vital. Losses due to product discoloration in one plant were running into thousands of dollars yearly. Then the protection job was turned over to AAF air filters. *Not one cent* has been lost in the year since their installation.

FILTERS PROVIDE 3-WAY BENEFITS. In addition to the tremendous dollar savings through quality protection, AAF filters cut cleaning costs, provide healthier, happier working conditions. And AAF assures you of the *right* filter for your requirements, *because AAF makes them all*—electronic precipitators, dry filters and viscous impingement types.

HOW CAN CLEAN AIR HELP YOU? If dirt and dust are hampering your business in any way—production, maintenance or employee morale—consult the AAF representative in your area. Write for his name plus free copy of booklet, *"Better Air Is Our Business."*

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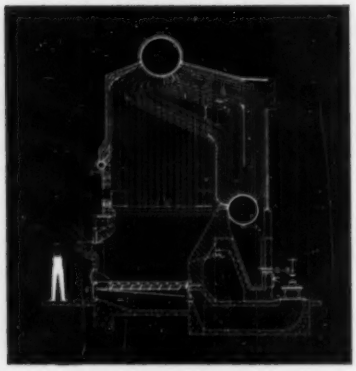
Steam

FOR THE SUGAR INDUSTRY

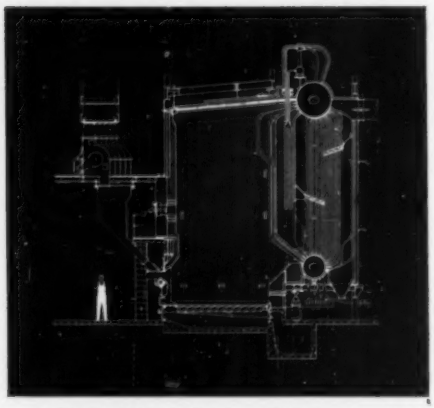
Combustion Engineering offers sugar mills a complete line of steam generating units equipped with stokers especially designed to burn bagasse better than can be done by any other method.

Such boilers, with a total capacity of more than 5,000,000 pounds of steam per hour, have been purchased for this service around the world.

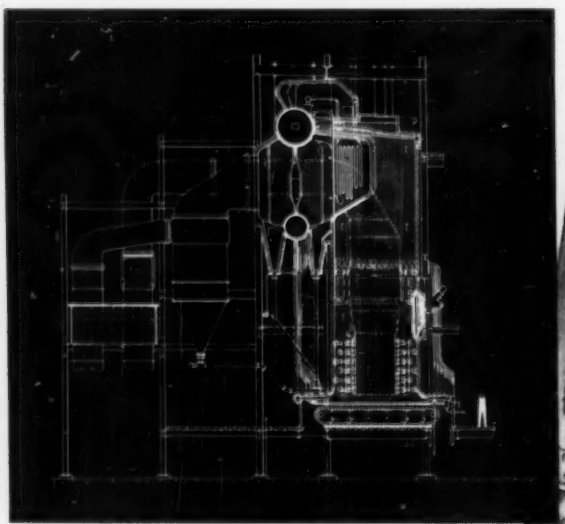
So—when you need equipment of this type buy from C-E, the company with extensive experience in your industry. Consult our representatives in your area, or our Export Department in New York.



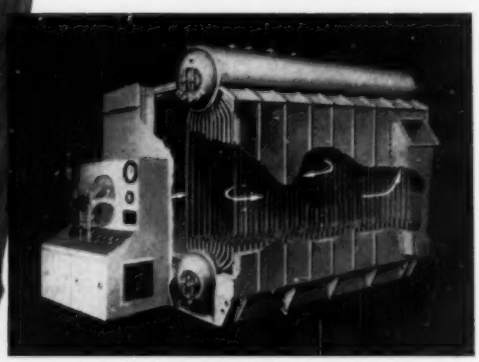
C-E Vertical-Unit Boiler, Type VU-10, equipped with C-E Bagasse Burning Stoker (Dump Grate Type). Units of this design are suitable for steam capacities up to about 45,000 pounds of steam per hour.



C-E Vertical Unit Boiler, Type VU-50, equipped with C-E Bagasse Burning Stoker (Dump Grate Type). This design is suitable for steam capacity requirements up to about 125,000 pounds of steam per hour.



C-E Vertical-Unit Boiler, Type VU-40, equipped with C-E High-Set Bagasse Stokers with continuous discharge traveling grate; tangential, auxiliary oil burners and tangential air admission are also employed. Especially suitable for steam requirements above 125,000 pounds of steam per hour.



C-E Package Boiler, Type VP. This oil or gas fired unit is especially suited for off-season and auxiliary steam needs. It is a complete, compact, shop-assembled boiler—simple and economical to install, operate and maintain.

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Today's Salesmen Are Different

SERVICE—not "high pressure"—is the mark of salesmanship. And good salesmen are hard to find.

SALARIES are playing a bigger role in compensation. But extra incentives are important too.

Every call an industrial salesman made in the U.S.A. cost his company an average of $17.29 in 1955. This cost has been increasing year after year. Ten years ago, the cost per call was $10.72—and if you allow for rising prices, the increase works out to 13%.

Selling is an expensive business, these figures say. Beyond that, average cost per call has widely different meanings for individual companies. How many calls does it take to make a sale? Salesmen of lower-cost products may have to turn in a high ratio of sales to calls; salesmen of expensive capital equipment can pursue a client for months for one key sale.

But whatever its product, an industrial company must get the best possible performance from its salesmen. Good salesmen are hard to find; and selling is not one of the most popular professions. To many people, the work brings to mind an unpleasant, "high-pressure" man with a foot stuck in the door. "High income, low social status" is a widely accepted description of the salesman.

I. Today's Salesman

There is little basis in fact. A veteran purchasing officer was recently asked by *Industrial Distribution* magazine what qualities he considered essential for today's salesman. His answer: appearance, consideration of others, faithfulness, confidence, integrity, persistence, ambition, knowledge of his customer, and knowledge of his own company.

A sales executive at the Minneapolis Honeywell Regulator Company (U.S.A.) says his most highly rated salesmen have, in addition to "personality," the salesman's traditional strongpoint: "savoir faire, sophistication, a great degree of realistic imagination, intelligence that seeks knowledge rather than information, and, above all, culture."

The successful salesman is at his best in competitive situations. He understands his customers' needs; in turn, his customers seek his advice and counsel. In brief, he is a professional specialist.

To encourage these traits, Honeywell has removed the ceiling on its salary range for salesman. They no longer have to become managers to stay well paid. "We pay for performance in the sales area," Honeywell emphasizes.

The salesman's prime motivation is money, and most salesmen are quick to admit it. Close behind, though, is a sincere liking of people: The salesman has an outgoing personality.

Selling techniques have been explored and expounded in hundreds of books—books filled with bubbling optimism and sure-fire ways to conduct a sales talk. But each selling situation is different. The approach that sells one customer may irritate the next.

One sales tool, however, deserves more consideration by management—the use of visual presentations, charts, and graphs with brief explanatory notes. The best use of presentations is to analyse special problems, and they are prepared after the problem is solved. And the salesman should not just read the printed text; he should use his own words. But depending wholly on presentations as the prime-mover in sales can result in stilted selling.

Today's salesman is striving for a continuous relationship, not a one-shot sale. And he is faced with a complicated situation. He often has to sell through an intermediary—a Purchasing Department official who does the buying, but does not make the buying decision. Trying to find out who to see is a difficult job in itself; and if the salesman does get to see production people, he has to have something to offer. That is why there is so much emphasis on service in selling.

More companies, too, are buying to their own specifications. The latest buying technique is called "Value Analysis," which, in essence, is scientific purchasing.

When a salesman calls on the General Electric Company, for instance, he is given a booklet that tells him, "You, the salesman, fit into this Value Analysis picture. Whatever your field, you are in the best position to acquaint us with how your company can help." Purchases at General Electric are based on three factors—quality, service, and price. If quality and price are in line, the booklet points out that salesman's best selling tool is a cost reduction suggestion.

Selling through an organized purchasing department also means that the salesman does not have to worry about "overselling" in the physical sense. He is dealing with people who know their business. "Overselling" is a verbal pitfall—of "talking his way into and out of the sale."

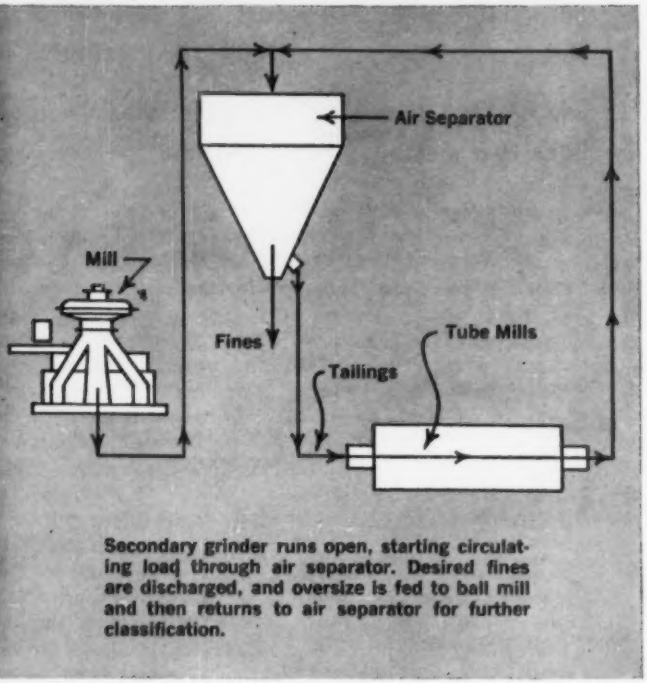
II. Salary vs Incentive

One out of four industrial salesmen in the U.S.A. are paid straight salaries; and over half the others receive part salary, part incentive. Ideally, the salesman's compensation should reflect the territory—different territories require different degrees of salesmanship—and the man himself.

One marketing expert, writing in *Chemical Week*, suggests that a weighting system can be a valuable aid in setting salesman's salaries and bonuses. Such factors as sales volume, gross profit, accounts over a certain size, number of accounts, and travel difficulty determine the value of a territory. Rate each territory from one to 10. Then, to properly balance the factors, assign comparative multi-

Stop Overworking Grinding Mills

FEED SPOUT
Sturtevant Air Separators come in 9 models, diameters range from 3 to 18 ft.
TAILINGS DISCHARGE
FINES DISCHARGE



Secondary grinder runs open, starting circulating load through air separator. Desired fines are discharged, and oversize is fed to ball mill and then returns to air separator for further classification.

LET STURTEVANT AIR SEPARATION HELP YOUR SYSTEM PRODUCE UP TO 300% MORE 40 TO 400 MESH FINES — CUT POWER COSTS AS MUCH AS 50%

Fines that pass through grinding mills unhindered, serving only to increase the work load, can be quickly classified by a Sturtevant Air Separator operating in closed circuit. With all oversize automatically returned for further grinding, the result is production capacity impossible to achieve in single-pass grinding — as well as a better, more uniform product.

Closed circuit grinding and air separation is of proved advantage in *all* secondary reduction processes. Grinding mills are free to perform at top efficiency, their output frequently increased as much as 300% and power costs cut up to 50% (documented by 30 years of Sturtevant air separation experience in the cement industry). Further, attritional heat is dissipated by greater surface exposure.

Sturtevant Air Separators Keep Grinding Units At Peak Efficiency — Classify Feed Loads to 800 Tons Per Hour

Sturtevant Air Separators circulate production loads with exact control of air currents and centrifugal force. Simple adjustments make possible counter-action between the two to the point where a product of almost any desired fineness may be collected while coarser sizes are rejected.

A 16 ft. Sturtevant, for example, took a feed rate of 800 tph, containing only a small percentage of desired fines, and delivered 30 tph 90% 200 mesh, recirculating the oversize through the grinding circuit. (In the cement industry, Sturtevant units deliver up to 60 tph raw cement fines, 40 tph finished cement fines.)

Sturtevant's ability to engineer precise, high capacity classification for closed circuit grinding systems is the result of long experience with a wide variety of dry processes. Sturtevant designed its first air separator some 40 years ago — and has been pioneering developments in centrifugal classification ever since.

Current users of Sturtevant Air Separators include manufacturers of sulfur, soybeans, phosphate, chocolate, feldspar, sand, pigments, limestone fillers, abrasives, plasters, ceramics and cement.

Designed for precise separation of all granular materials, Sturtevant Air Separators have been adapted to other materials as well. Johns Manville, for example, uses a 10 ft. model to separate 3 to 6% undesirable rock from asbestos.

Ruggedly constructed, Sturtevant units are designed for minimum maintenance — at a Midwestern rock-crushing plant, a 10 ft. Separator operates outdoors year-round with only routine care.

For further information, request Sturtevant Bulletin No. 087. Write Sturtevant Mill Co., 141 Clayton St., Boston 22, Mass.

STURTEVANT

Dry Processing Equipment

CRUSHERS • GRINDERS • MICRON-GRINDERS
SEPARATORS • BLENDERS • GRANULATORS
CONVEYORS • ELEVATORS

pliers. For instance, sales volume might rate a multiplier of 10, travel difficulty might rate 3.

Next, set a salary range for each territory on the basis of the total points. The best territory might be $9,000 to $12,000; the second, $7,000 to $10,000; the third, $5,000 to $8,000.

Now rank each salesman, using a similar weighing system. The important factors are sales effectiveness, effort, ability to train others, sales judgment, years of experience. Then compare each salesman's rating with the importance of his territory. It is possible that a salesman in a low-ranked territory might deserve more pay—because of a better job—than the man covering a more important territory.

Promotion, for the salesman, is a matter of products, accounts, territories. The incentive plan can work from weighted factors such as: met quotas; increased present share of customer's business; performed introductory work on new products; opened new accounts; established company as alternate source of supply; self improvement. In practice, incentives rarely add more than 25% to salesman's salaries.

The current trend is to give bonuses based on a percentage of base salary. There are many modifications and variations, but a typical plan works like this:

An average of several years dollar sales is taken as par. When the salesman reaches 90% of par in his current performance, he qualifies for a small bonus. At 100%, the bonus becomes "mod est;" and above par it increases rapidly up to 130% of par—this maximum performance yields 12½% of his salary. The assumption is that sales above that level are mostly "windfalls."

This plan also allows for an additional 12½% of salary for achievements not connected with sales—such as missionary work on new accounts.

Today's salesman is often called a "Company Representative," for good reason. He spreads the story of his company, sends back reports of how the company is doing. He is a front-line reporter, market researcher, public and customer relations man.●

Cool Air Means Comfort Plus Efficiency

with General Electric Air Conditioners "tailored" to your needs

Here's modern, low cost way to keep customer goodwill and employee efficiency...and do it with amazing economy.

SPECIFY G-E Packaged Air Conditioners for a consistently cool, clean atmosphere. Requiring little, or no, plant remodeling, these units can be installed . . .

ANYWHERE—in areas to be cooled, or tucked away; on the floor or overhead.

ANYTIME—no interruption of daily business; units can be added as needed.

Since units are adjustable to individual area cooling needs, and each unit serviced without shutting down the system, operating costs are minimized. And, G-E offers a 5-year warranty on the sealed refrigeration system.

RIGHT NOW, ask your G-E representative for a "climate" survey of your plant. There's profit in it... **for you.**

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GENERAL ELECTRIC
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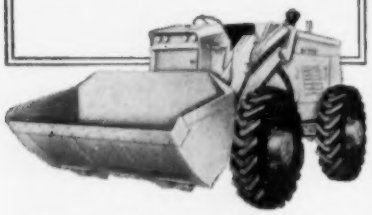
Now! A Ten-Ton Wheel Loader with ONE-LEVER Control of ALL SPEEDS— forward and reverse



New TRACTOMOTIVE TL-20 TRACTO-LOADER®

9,525 kg (21,000 lb) • 1.53m³ (2-cu yd) capacity • 100 hp

FASTEST OPERATING BIG LOADER YOU'VE EVER SEEN. A full power-shift transmission with ONE-LEVER control enables you to go from *any* forward to *any* reverse speed *instantly*. There's no speed range lever — *one lever controls all speeds*, forward and reverse. There's no stop-and-go shifting . . . you quick-shift while moving. And this ONE-LEVER control is exclusive with Tractomotive!

PLUS these loading and construction advantages:

- *Hydraulic Torque Converter Drive*
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- *4-Wheel Drive and 4-Wheel Power Brakes*
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- *Unit Construction for easy servicing*
- *Big Lift and Dump Cylinders — out of the way and out of the dirt*

Ask your ALLIS-CHALMERS CONSTRUCTION MACHINERY DEALER to show you the *extra* profit-making ability of the TL-20— the very Latest in Big Loaders! Write for literature.

TRACTOMOTIVE

Tractomotive Corporation

Export Dept.MD, Deerfield, Ill., U. S. A.

▶ FINANCIAL DIGEST

Rising sales, falling profit margins—investors and businessmen have noted the trend for over a year now.

As spring brought in its flood of 1956 corporation reports and first-quarter 1957 earnings statements, investors dug in with apprehension. The conclusion: some very bright spots, some dark spots—but over-all, better than expected.

In the U. S., the steel industry came in for wide comment. Of the first 11 companies reporting, eight were off from last year's first quarter. But some of the specialty producers showed spectacular gains. In other industries, too, selectivity is the watchword of investors. Consistently higher earnings were reported by oil and drug companies. Chemicals, paper, building supply, and food were caught in the profit squeeze. And in the automobile industry, last year's performance was reversed: Chrysler and Ford are the pace-setters this year; General Motors' earnings are off.

In Britain too, first-quarter earnings were spotty. The rate of return on investment was slower, in line with the world trend. Generally, companies close to the consumer—beer, food, stores—did better than industrials. Some of the other bright spots:

—Suez had unexpectedly little effect on the 1956 earnings of Royal Dutch Shell. Sales were up 8%; net income 12%.

—Giant Unilever last year raised its rate of return on capital from 9.8% to 10.2%. The annual report noted "remarkable headway" in synthetic detergent sales.

—British auto firms are enjoying booming export sales to the U. S. market, passed 19,000 in the first quarter, as compared to 5,808 for first quarter 1956.

—Improved automobile exports are apparent elsewhere too. Italy's Fiat, in preparation for a major assault on overseas markets, is increasing its capitalization from $122-million to $150-million. France's Renault increased exports almost 20% last year—its "Dauphine" is proving a tough competitor for Volkswagen and the British in the small car market.

The German boom continues apace. The D-mark is closer than ever to complete convertibility. And look how Farbenfabriken Bayer, a splinter of the old I. G. Farben trust, has regained its international position. Despite heavy outlays for research and plants the company showed record earnings last year.

●

Austria is selling public stock in its nationalized industries. As a concession to socialists, however, the State will maintain voting control. Private investors are being brought in, according to Finance Minister Dr. Reinhard Kamitz, because the public had no sense of participation in the economic fate of the nation or its enterprises. Banks are being denationalized first because of their influence in economic affairs.

The response from the public exceeded expectations. For one reason, the shares will yield about 5% after taxes, which is more than interest paid on other savings.

Spread of private ownership, Dr. Kamitz told a reporter of the *New York Times*, might induce Austrian enterprises to open their operations to closer inspection.

This combination of features is EXCLUSIVE with . . .

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BALL BEARING UNITS

. . . they are IMPORTANT TO YOU!

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The products you design today to meet the demands of tomorrow must be carefully engineered right down to the smallest component. The product must be geared to the demands of an "automation minded" world and the competition of the years ahead. Production schedules can't be kept up when machinery is down for maintenance. No component you can build into your products will mean more to its efficient performance than the bearing units carrying the load. The exclusive combination of features found only in SEALMASTER self-aligning, pre-lubricated Bearing Units are important to your product's continuous performance and acceptance.

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A DIVISION OF STEPHENS-ADAMSON MFG. CO., 123 RIDGEWAY AVE., AURORA, ILLINOIS

To-morrow *is not so far away :*

Renault proves it **to-day**

Yes, Renault does think of the future. The future will, for one thing, be shaped into a turbine car. This is why the Etoile Filante has been designed, a car which during the very first test run on the Salt Lake tracks, broke 4 international records at a speed of nearly 192 MPH. The Etoile Filante is not a racing car but a traveling lab enabling the engineers to work out the hard task of adapting the aircraft turbine to car-driving.

These men also had to tackle yesterday with the engineering problem of designing a new model of an economical car. These men designed the **Dauphine,** this wonderful car with accommodation for four, wich was acclaimed by technical experts in all countries as one of the finest achievements of the last 10 years.

Commercially, the Dauphine proved to be an outstanding success, within a few months. It worked like magic but it wasn't. There is no magic in the field of large volume manufacturing. Every step forward is backed by extensive research work and testing on numerous prototypes until the final development stage is reached.

This explains why the Dauphine is daily a delight for thousands of motorists who cannot imagine that hundreds of technicians have carefully been considering every detail of it for years, with the same thoroughness they are now devoting to other yet secret, assignments.

An automobile is a team work achievement. If you admire the Etoile Filante, you can also have confidence in the Dauphine and in all the other models of the Renault manufacture. They all have the same offspring and the same quality.

The present is merely yesterday's future and we have no short range policy at Renault.

THE RENAULT DAUPHINE
SETS THE PACE
IN YEARS-AHEAD CARS

After a fast-braking test, tire made from new "3-T" cord is hot enough to fry egg—and still survive. It's one example of how industrial textiles change, and how users are finding . . .

Better Fabric for Industry

Digested from TEXTILE WORLD, Mar, p99, Apr, p120

Any user of industrial fabrics—and all businesses use them in one way or another—can see changes coming in the field.

But the changes are more dynamic, and the field larger, than you may suspect. One third of the U.S.A.'s textile output, for example, goes straight to industry; and as world-wide industrialization proceeds, rising consumption of industrial fabrics may well partly offset lagging growth of apparel textiles (Report to Management, MD, May).

Industrial fabrics cover a tremendous range. Some are used directly by industry—lowly wiping cloths, for instance. Some are processed into typewriter ribbons, tires, or conveyor belts. Some go to special markets such as auto upholstery, fire hose, parachutes.

In all these fields changes are coming fast. Look at fire hose.

As population grows, fire protection facilities must expand to keep up. Since cotton fire hose mildews when stored wet, firemen—especially the increasing number of part-time, volunteer groups—prefer the new Dacron (Terylene) hose, which can be stored wet, is strong, light, flexible.

Dacron fire hose is just one example of how, and why, synthetics replace cotton in many industrial applications. Another might be Caprolan, the new "deep-dye," high-strength nylon now being manufactured by the U.S.A.'s Allied Chemical & Dye Corp. for a range of special industrial uses (see cover picture).

The special properties of synthetic fibers can produce special fabrics. Polyethylene yarn, for instance, has an unusual amount of stretchability. Textile processors weave prestretched yarn into a fabric lengthwise; then they immerse the fabric in hot water.

The result: new "3-D" (three dimensional) automobile upholstery, with puffs and valleys formed by the contraction of the polyethylene yarn. This fabric allows free circulation of air between the sitter and the seat, provides long-lasting quality and enough stretch to fit seat contours.

Put all the uses together, and the market for industrial textiles is vast. Here are some typical uses:

- Abrasives
- Anode bags
- Automobile fabrics
- Awnings
- Bags
- Boat covers
- Book bindings
- Buffing wheels
- Typewriter ribbons
- Conveyors
- Diaphragms
- Dust filters
- Handbags
- Hose and belting
- Insulation
- Laundry nets
- Liquid filters
- Tobacco wraps
- Military equip.
- Movie screens
- Gasketing
- Plastic laminates
- Pneumatic tires
- Printers' blankets
- Rubberized fabrics
- Safety equip.
- Sails
- Surgicals
- Tarpaulins
- Tents

For the lowliest of the industrial fabrics—wiping cloths and cheap wrappings—strength and rigidity are not required, and the cheaper the better. A lot of this production comes from circular knitting machines—the fastest and cheapest way to convert yarn.

Nonwoven fabrics—made by bonding layers of fibers together—also make cheap, serviceable wiping cloths. And these fabrics are finding an increasingly important place in industrial markets. One of the most successful applications is in the filter field, and synthetics are proving their worth here. Other uses include insulating tapes, gaskets (usually made of Orlon), and vinyl-coated side panels for automobiles.

Another cheap way to make cloth is with tufting machines. Its prime market, however, is the low-cost carpet trade, and tufted carpets are gaining favor as automobile floor coverings. Other industrial developments have been slow because manufacturers can sell all the carpets they make.

Glass fibers are ideal for applications that demand resistance to high temperature, chemicals, moisture, and rot. Major users are manufacturers of electrical equipment, wire, and cable.

There is a promising future for glass-fiber fabrics. Reinforced with plastics, they can be molded into a wide range of products—boat hulls, structural building panels, appliance parts.

When coated with rubber or various resins, these fabrics retain their unique properties; and in addition, have a high tear strength and dimensional stability. They are used as floor and wall coverings in ships and aircraft, upholstery materials, tops for convertible automobiles, flexible hot air ducts and gaskets.

Glass is by no means the only fabric that is coated. Coated or laminated fabrics can be produced to almost any specification.

Nitrated cotton—usually called celluloid or pyroxylin—is still an important coating medium.

Neoprene is a widely used coating for ducting, such as used in mine heating and ventilating, and industrial aprons. Neoprene retains its flexibility, is resistant to oil and chemicals, and can be

CHILE	COLOMBIA	PERU	ARGENTINA
SPAIN	PORTUGAL	SO. AFRICA	SWEDEN
ISRAEL	JAPAN	BELGIUM	MEXICO
INDIA	AUSTRIA	BRAZIL	CANADA
ITALY	GERMANY	URUGUAY	ENGLAND
DENMARK	FINLAND	FRANCE	U.S.A.

24 NATIONS UNITED...
on Choice of Yoder Mills for Pipe and Tube Manufacture

It all started less than two decades ago with the introduction by Yoder—and the rapid adoption by American industry—of a revolutionary new type of mills for cold forming and electric-resistance welding of pipe and tubing. England, France, Italy, Mexico, Argentina, and Brazil soon followed the U.S.A. in adopting these mills. Other countries boasting any kind of modern metal working industry did likewise, even including distant Japan, India and South Africa. Production, depending on requirements, varies from 25,000 up to 75,000 feet per 8-hour shift.

●

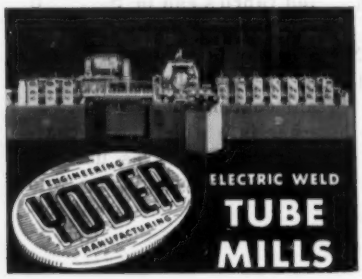
By this time, England, Italy and Argentina each have a total of ten Yoder mills in operation; Brazil, eight; Mexico, six; France, five; other nations somewhat in proportion to their population. In many nations, Yoder mills now supply from 50% to 90% of all welded tubes used. Several oustanding production records have been scored by operators in foreign countries, most recently in Italy. Reasons: the simplicity of design, ease of operation and dependability of Yoder mills. Secondly, generous assistance rendered by Yoder in training operators everywhere.

●

Through technological advances, Yoder leadership in tube mill design has been jealously maintained and strengthened from year to year. Ask for literature giving details of the latest improvements. Correspondence invited.

THE YODER COMPANY

5517 Walworth Ave. • Cleveland 2, Ohio, U.S.A.



made fireproof. Rubber and the newer resins, and plastics are also widely used.

Standard cotton fabrics are usually suitable for coating. But the synthetics are making inroads, particularly for lightweight temporary shelters. Examples:

Neoprene or vinyl on nylon: a fast-growing market in tents, truck tarpaulins and playing field covers. The fabrics are light.

Vinyl plastic on Fortisan 36: This material is translucent; so shelters transmit light.

Vinyl and vinyl-covered fabrics are gaining in the competitive automobile upholstery market.

The automobile industry is, of course, the market for tires, built up of rubber and tire cord fabrics. Today's high speeds generate tremendous heat—a mortal enemy of tire cord. To make tires that will withstand the heat and punishment, tire cord producers—mostly the tire makers themselves—have fathered a minor technical revolution. A new process called 3-T (time, temperature, and tension) cost Goodyear Tire & Rubber Company of the U.S.A. $5-million and 60,000 engineering manhours to develop. Nylon and rayon are stretched under tons of tension and stabilized at their maximum point of strength and resiliency. Tires made of 3-T nylon cord have been rammed head-on against curbs without breaking a single cord—at speeds up to 88 kilometers per hour.

A by-product of the 3-T process is a new self-sealing tubeless tire that doesn't collapse after a blowout. A motorist can drive for 160 km. on a tubeless tire ripped wide open.

Goodyear has also developed a helicopter rotor made of an inflatable double fabric, coated and held together by interlocking threads.

For variety, though, no industrial fabrics can compare with abrasives. Commonly called "sandpaper," coated abrasives are made in more than 2,000 different types—in rolls, belts, sheets, molded shapes, and cartridge belts. They are used on ferrous and nonferrous metals, wood, granite, marble, painted surfaces, glass, and leather.

Essentially, a coated abrasive is a paper or fabric backing covered with a layer of abrasive grain embedded in adhesive. The grain—applied by gravity or electrostatics—can be varied from a very light, open coat to a dense mass. Glues, starches, clays, and resins are used to build special properties into fabric backings. Cotton jeans, drill, print cloth, and twill are widely used.

Rayon, however, is gaining attention through a new material called Sand Screen, developed by The Carborundum Company, a major producer of abrasives. The sanding residue passes through the open mesh construction, and there is no clogging. The backing of filament rayon (with a weaving construction of 24 threads per inch both ways) has high tensile strength and excellent surface characteristics. Both sides are coated with silicon carbide.

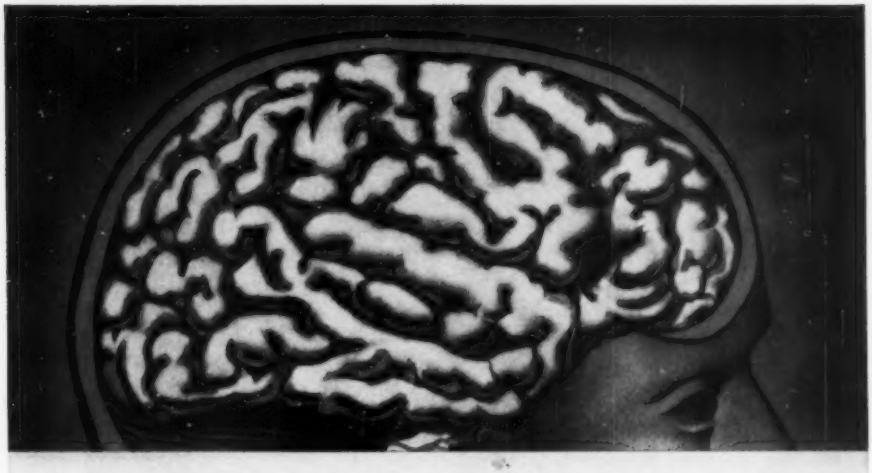
In selecting fabrics, abrasives experts look for high tensile strength, tear strength, folding endurance, flexibility, and availability in unlimited quantities.

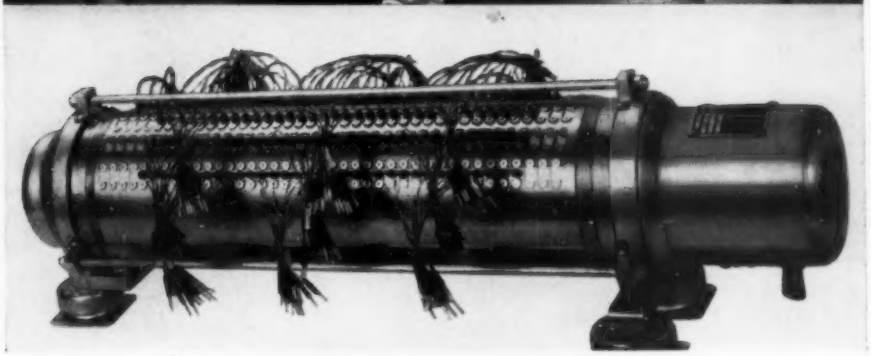
Paper makers felt is a textile product manufactured exclusively for one industry. These felt blankets are used to cover drums on paper making machinery. Most blankets are wool, but synthetics are proving their merits here.

Another industrial felt—little known but fast growing—is made on needle looms. A batt of fibers is punched into burlap or paper to make carpet lining, insulating, slippers, and cartridge wadding from jute, sisal, hair and similar fibers. Higher quality felts are made of Orlon and Dacron—in thicknesses as low as 77 mils. These are going into filters reinforcements for plastics, and insulation.

The newer synthetics are being used more and more in industrial fabrics. High tenacity rayon has experienced a phenomenal growth. Dacron is replacing nylon in parachute fabrics, and look soon for combination Dacron-nylon belting.

New developments are pouring out of the industrial laboratories—nylon body armor for soldiers; nylon fish nets; Teflon—Du Pont's new industrial fiber woven into a fabric—becomes a filter for beer, chemicals, and soap, or goes into laundry textiles, special conveyors, and belting. ●





THE HUMAN BRAIN:

Is science making it obsolete?

AN intriguing question, particularly so with the development of *electronic* brains – such as the Remington Rand UNIVAC "memory" drum shown above. The best answer to this question comes from the scientists themselves. It is an unequivocal "no".

Although electronic brains perform many of the routine problem-solving functions of the human brain – and do so with unfailing accuracy, at speeds that are literally inconceivable – electronic brains can never duplicate the higher creative functions of which the mind is capable. On the contrary, by relieving the mind of tedious, time-consuming chores—and supplying it with up-to-the-second information never before obtainable—electronic brains are significantly raising the level of human thinking power.

Aided by Remington Rand UNIVAC, scientists have tracked down the "lost" eighth moon of Jupiter . . . have completed, in a single day, aircraft design research which previously would have taken many years. Government administrators have erased long-standing clerical backlogs *overnight* . . . have reduced census tabulating to a quick, simple, automatic operation.

It is the world of business, however, that UNIVAC'S real value lies – particularly with the development of the new UNIVAC 60/120 series. This flexible family of computers enables every type of business organization – from the smallest to the very largest – to benefit by the **economy through efficiency** afforded by UNIVAC electronic data-processing.

In modernizing today's office – in helping management to keep costs down – Remington Rand UNIVAC is making an important contribution to business . . . to the economy . . . to our way of life.

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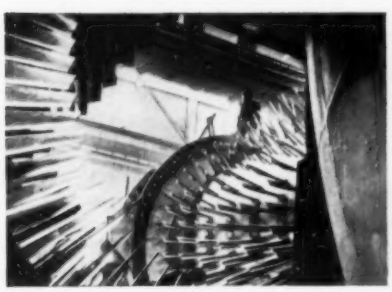

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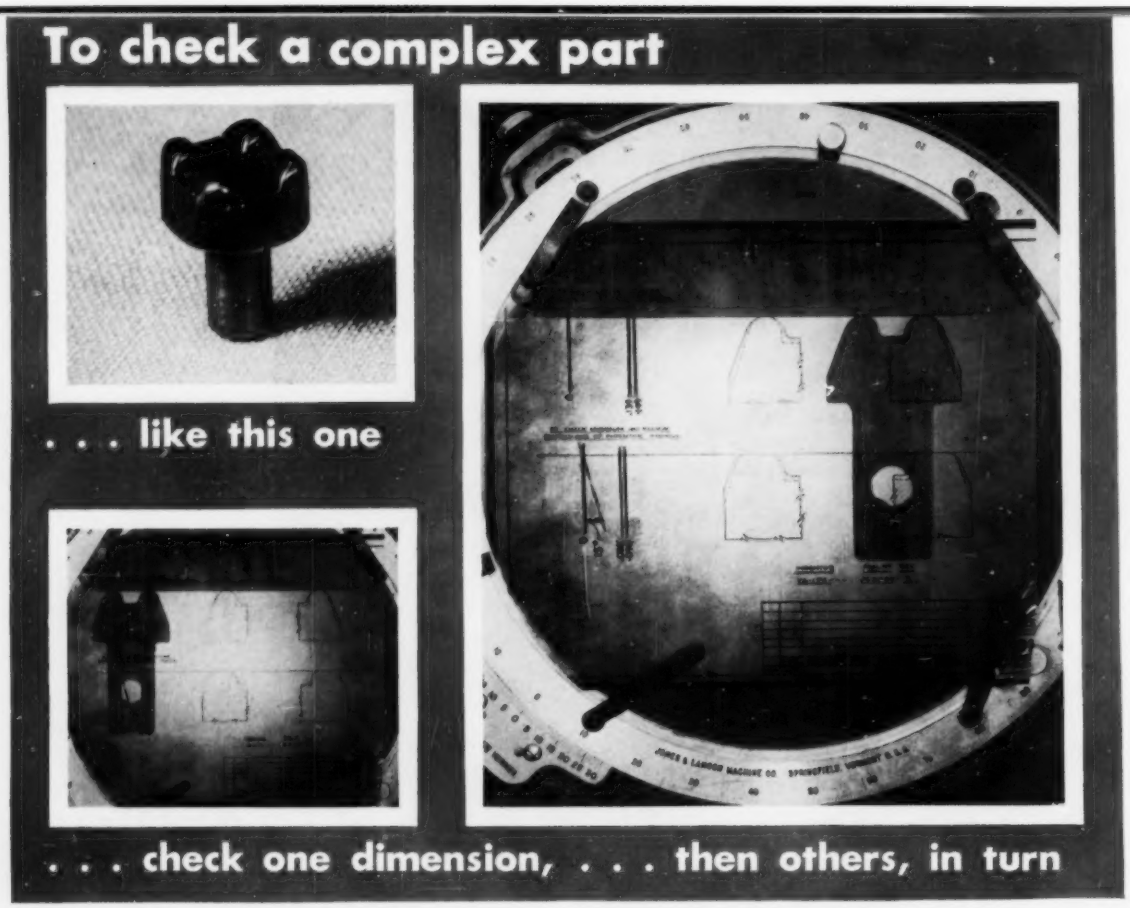


"Shadowgraphs" for Quick Inspection

Digested from FACTORY MANAGEMENT & MAINTENANCE, Apr, p106

There's a new technique that any plant can use to cut inspection time and cost for odd shapes and small lots. It is inspection by "shadowgraph"—and its chief piece of equipment is an optical comparator.

A shadowgraph is a line drawing of a part, or portion of a part. But it differs from an ordinary part drawing in that the lines defining the shape of the part also show, in scale, the tolerances specified. With a shadowgraph and an optical comparator you can check a part's tolerances without measuring. The technique also:

—Cuts inspection time and cost on irregular and complex shapes.

—Allows better decisions for approving, rejecting, or repairing.

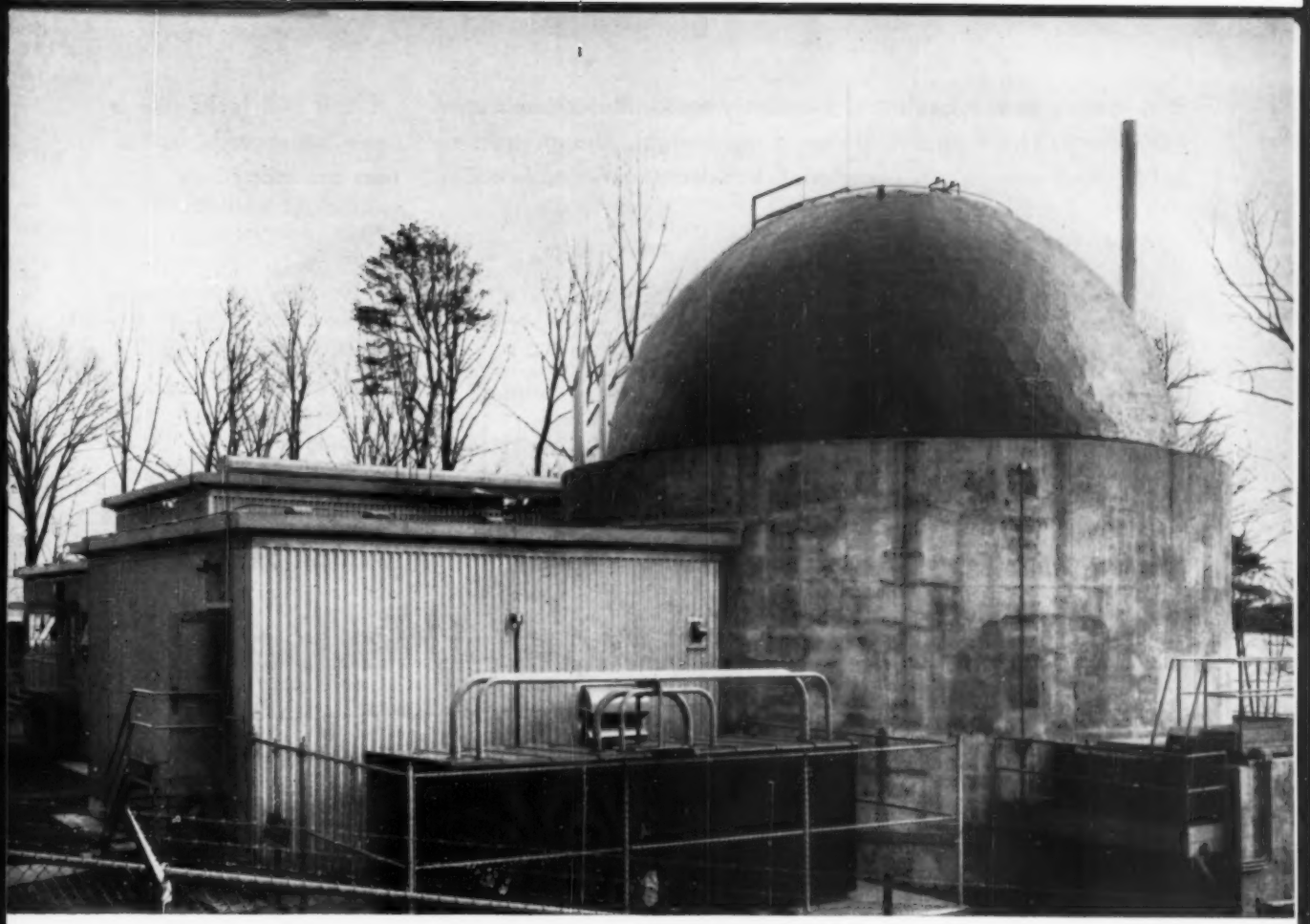
Any plant—even a small one—that has a competent draftsman and a comparator can make and use shadowgraphs. The comparator usually provides a 10X magnification and can easily and surely handle tolerances 0.050 millimeters to 0.075 millimeters. (If your tolerances are less, you can use more care with shadowgraph line thicknesses, and you can use glass instead of tracing cloth for the shadowgraph.) Acetate transparencies can be made from the tracing-cloth master and the master filed for safekeeping.

Here's an example of how shadowgraphs are used. The part (above, top left) is used in a small hydraulic press to indent electrical connectors.

Profiles are checked this way: Because the over-all height and nose contour are the most important dimensions, the tolerance lines start at the top and diverge from there (above, right). One shows maximum outline (solid line), the other shows minimum (broken line). As long as the part's outline falls between these two lines, the part is within tolerance.

Prong spacing is checked this way: The left-hand vertical line (above, bottom left) is marked "O." The 0.144-inch dimension separating one peak from the other is shown by the two tolerance lines to the right of O. One line is 0.139 inch (0.144 − 0.005) away from O. The other line is 0.149 inch (0.144 + 0.005) away from O. Thus the tolerance is ± 0.005 inch. As the photo shows, the left prong center is placed on line O. The right prong center must fall between the two tolerance lines to be acceptable.

Checking the part's other axis is a little more complicated; the prong's flat top does not permit optical centering. However, the sides of the prongs slope 15°. A 15° "V" is drawn on the shadowgraph instead of the base line O as before. The V's apex intersects a horizontal line drawn across the prong's top. To center the prong for inspection, the operator aligns the side of the prong with the angled side of the V. At the same time he keeps the radius at the top of the prong tangent to the horizontal line. The required 0.090-inch spacing is laid out as before. The intersection of the 15° angle and the top of the right prong must fall within the tolerance limits. ●



ALCO-built APPR is PWR design, generates 2000 kw. U. S. Army uses it to train personnel to operate planned similar atomic plants in remote areas.

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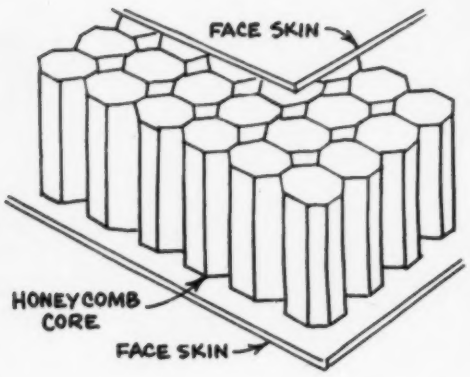
. . . industry sees in honeycomb sandwiches a lightweight, strong structural material. It is deceptively simple and . . .

. . . it still looks like a bee's honeycomb, but its uses are many . . .



- Walls, partitions
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Taking Lessons from the Bees

Digested from AMERICAN MACHINIST, Mar 25, p137

BEES have been good engineers for millions of years; man is a comparative upstart. But now man is turning to the bee for some lessons in making a new (for man) structural material—the honeycomb. Human engineers are finding the honeycomb sandwich a lightweight, high-strength, versatile material with a tremendous potential for the future.

The sandwich-idea got its start during World War II with Britain's Mosquito light bomber. It had fuselage and wings made of a sandwich consisting of balsa wood as the "meat" and plywood as the "bread."

Since then, countless variations of the sandwich have been tried. Cores have been made of such low-density materials as balsa, cork, foamed glass, foamed plastics. But one of the most successful combinations appears to be high-density materials, in foil thin strips, formed into a cell-like structure.

Basically, a honeycomb structure, as man makes it, consists of a core (drawing above) that looks like the bee's handiwork—with two face skins bonded to the core. The core's thin strips can be formed to any of the shapes shown on the opposite page. The formed strips are set on edge, and faces that touch are bonded together to form a continuous structure. Face skins are thin solid sheets bonded to the core.

Chief virtue of the structure is its amazing strength-to-weight ratio. This is what attracted the aircraft industry. Now, about 20 companies in the U.S.A. and several in Europe are making honeycomb core materials. And they are sponsoring most of the development and product application work.

The materials they work with include impregnated paper, impregnated fabric, reinforced plastics, aluminum, stainless steel, and, most recently, ceramics (MD, May). Paper honeycomb is most familiar in commercial applications; the other materials are finding their prime outlets—so far—in miliary and civilian aircraft.

Meanwhile, dozens of applications for honeycomb exist in architecture, truck bodies, refrigerator walls, doors, and similar places. And as soon as fabricating methods are better understood, many more opportunities will appear.

Most studies of fabricating techniques are going on with metal honeycomb. Paper structures are usually used as flat sheets and the techniques are fairly straightforward. But most metal honeycomb applications require contouring, solid inserts, and even forming of curved surfaces. This, plus the honeycomb's peculiarities, often pushes fabricating techniques into brand new metalworking areas. And, too, metal honeycomb structures are expensive (see opposite page). So remember that the techniques are still mostly in the development stage—and changes can be expected.

I. Ice Holds Honeycomb

Metal honeycomb is obviously a difficult material to hold for machining faces without crushing or burning (ragged edges of the cell-walls) the cell walls. The problem gets worse as the core material becomes thinner. The core has to be held, and stiffened. So engineers have come up with methods that both hold the core and stabilize it.

Ordinary water is the most common dual-purpose stabilizer. The honeycomb can be set on a refrigerated platen, and water poured over it and frozen. Much experimenting has also been done with meltable or soluble materials to fill the "cons" temporarily. The material must not affect machining or tools, yet it must be easily removed after machining—without contaminating the core. Frozen mercury, plaster of Paris, starches, soap, resins, candy, wax,

and plastic foam are some of the filler materials tried, particularly for stainless honeycomb.

II. Machining Techniques

In some cases, stabilizing can be avoided by machining aluminum honeycomb in the billet form (compressed core that is practically a solid) then expanding it. Billets can be sawed and finished by almost any method. Some companies have machined tapers and simple curves. The effect of expanding the core is calculated in advance.

Machining processes on honeycomb core thus far have been largely bandsawing, milling, routing, and grinding. Paper, reinforced plastics and fabric cores can be bandsawed and sliced with ease in the expanded condition.

Conventional vertical bandsaws rough-cut expanded core. Tolerances do not have to be so close, because the core can be stretched or compressed slightly to fit. Normal practice is to cut a little large and compress the core to size.

For some structures, the sawed contour is accurate enough. Where tolerances are small, the saw only roughs out the billet, and other methods, usually the "valve stem" or "bologna slicer" finish the expanded honeycomb.

Slicing cutters look like large engine valves. They are disks similar to those used for cutting cloth or slicing cold meat and operate in much the same way. Hard-faced cutters will slice through stainless steel with little trouble; for aluminum, hardened steel cutters are suitable.

Rough-cut honeycomb can be "sanded" to close tolerances with water as a cutting fluid. One set up carries the core on an abrasive conveyor belt. No other holding method is needed; the conveyor-belt grit holds the work solidly. The core passes under a series of abrasive belts that grind the core to size, either tapered or flat. This method will work for stainless steel, but not aluminum.

Slab-milling of honeycomb core is much the same as regular milling. The core must be stabilized and filled, for instance with ice. The material cut is the stabilizer and the core.

III. Making a Sandwich

Most honeycomb sandwiches have the face skins joined to the core with epoxy-base adhesives. But research is looking into other materials. Much is required of the adhesives: They must be strong, resilient, adherent, resistant to moisture and some chemicals, thermally stable, and have long "shelf life."

Good bonding is secured with the application of heat and pressure. Steam coils usually provide heat. Air bags pressing on exposed portions of the assembly provide pressure.

IV. Brazing Stainless

Newest method for making stainless steel or titanium honeycomb sandwiches bonds cores to skins by brazing. The brazing material is used instead of adhesive when the sandwich is made. The resulting structure will withstand all present and projected aircraft and missile high-temperature requirements for a few years.

Brazing is no simple technique. Surgically clean parts are a necessity and the brazing flux must be a special type to insure corrosion resistance. Basic problems are positioning of brazing alloy, flux, and parts, accurate holding that will achieve metal-to-metal contact of faces and core, controlled heating and cooling rates to avoid oxidation of parts. ●

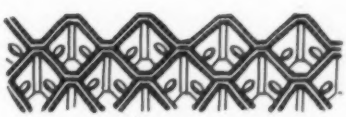
Here are some typical Honeycomb configurations . . .

HEXAGONAL CELL (paper, fabric, metals)

SQUARE CELL (metals)

SINE WAVE CELL (metals)

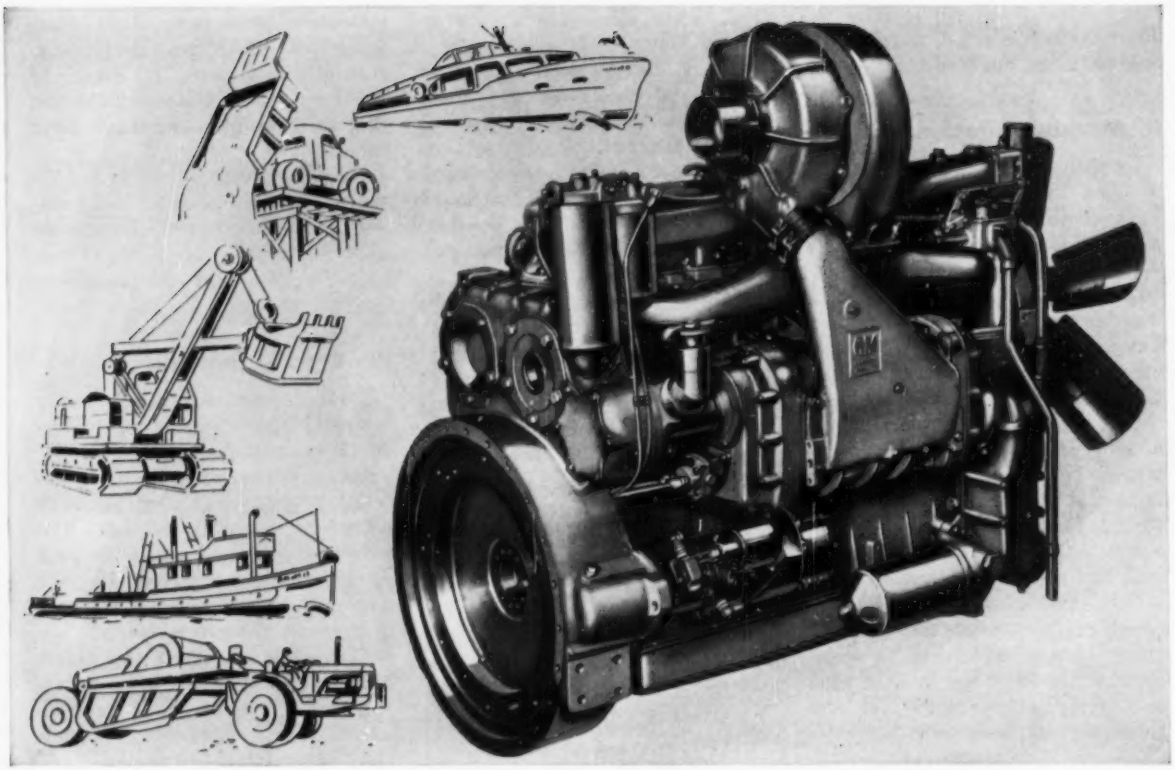
MULTI WAVE CELL (provides greater lateral strength)



SQUARE CELL with HOLES (for fluid transmission)

. . . and a comparison of Honeycomb uses, and prices.

	RANK		APPLICATIONS		MATERIALS	FINISHED
	By Volume	By $ Value	Aircraft	Other	$/Cu. Ft.	Cost/Cu. Ft.
Paper	1	4	25%	75%	0.25–5.0	$30
Fabric (Duck)	5	5	(almost abandoned)		20–40	Unknown
Glass Fiber	3	2	95%	5%	25–75	Unknown
Aluminum	2	1	85%	15%	4–20	100
Stainless Steel, Brazed	4	3	100%	——	400–500	$4000–$8000



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SWITZERLAND, Bienne
URUGUAY, Montevideo
VENEZUELA, Caracas

GENERAL MOTORS LOCOMOTIVES

Looking Ahead in Technology

● **STEEL-HARDENING TECHNIQUES may well be revolutionized by a new process** developed by a German scientist, Bernhard Berghaus. Called ionitriding, the process is claimed to double or triple life spans of machine parts. Parts are surface-hardened in a controllable high-current, glow-discharge apparatus. (McGraw-Hill World News)

● **BAGASSE—sugar-cane waste—may find still another use.** Nylonge Corp. (Cleveland, Ohio, U. S. A.) reports a practical method for converting bagasse to rayon. It could cut dependence on wood as rayon's raw material, and encourage rayon output in sugar-growing areas all over the world.

● **ALUMINUM cans are in pilot-plant production** at Germany's Aluminiumwerke Goettingen, subsidiary of Aluminium Ltd. (Canada). Cans begin as aluminum disks about 5 centimeters in diameter. These disks are fed to a press and struck a sharp blow with a punch. The aluminum "squirts" out over the punch to form a seamless can body. After filling, tops are crimped on to the cans. They are leak- and rust-proof, take inks well, and compare favorably in cost with conventional tin-plate cans.

● **NEW TEXTILE LOOMS use solid explosive pellets delivered on a paper tape to drive the shuttle back and forth.** Another loom design depends on exploding gasoline in compression cylinders for shuttle power. According to the developer, American Viscose Corp. (New York City, N. Y.), power-driven shuttles could reduce the number of loom parts by 35%. (*Business Week, Apr 6, p124*)

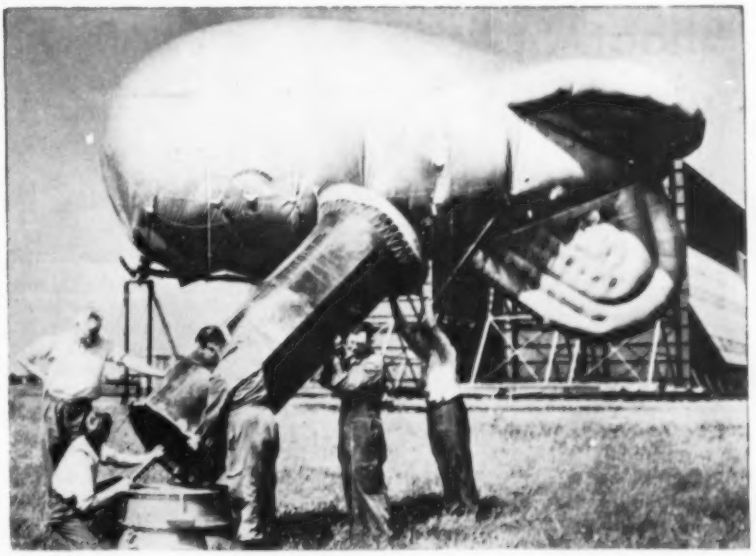
● **NEW RECORDING APPARATUS combines the elements of sight and sound in a "talking page."** The inventor, Tokyo's Prof. Yasushi Hoshino, claims his "synchro-reader" may revolutionize present educational, filing, and mass-communication methods.

The device permits the user to look at pictures, diagrams, or written matter while listening to related material recorded on a magnetic plastic "synchro-sheet" pasted on the back of the picture or page. The synchro-sheet is held stationary on the synchro-reader while three electro-magnetic reading heads move over the back of the document. The sheet can be ironed on to any paper. (*McGraw-Hill World News*)

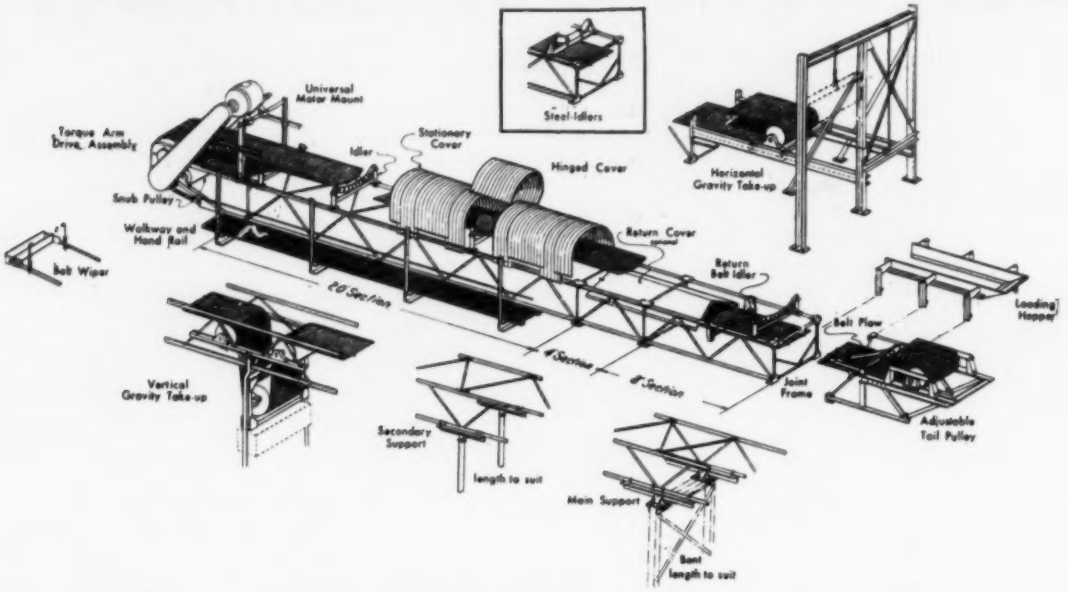
● **TWO MORE IDEAS have been added to the list of ways to ship petroleum in plastic bags** (MD, Apr, p17). A German engineer says his compartmentalized, mesh-bound plastic tubes can hold up to 10,000 tons of oil each. Three tubes towed by one tug would cost a total of $1.3 million and would be equivalent to a $5-million tanker.

Israel's Railroad Administration is testing a plastic container for large-scale transportation of liquid fuels on railway flat cars. Cost is estimated at about one-fifth that of a railway tank car. (*Petroleum Week, Apr 5, p54; National Petroleum News, Apr, p109*)

● **METALWORKING CHIPS and turnings can be converted to parts**—with great potential material savings. Chips are crushed and broken into convenient sizes and cold compressed into a blank slug. The slugs are heated in an inert-atmosphere furnace to 820°C. and extruded to part shape. Physical properties of such parts closely approach those made from mill-processed steel. (*American Machinist, Apr 8, p160*)



● **BRITISH agricultural experts** at a research station in Rothampsted, Hertfordshire, have risen to the occasion in the fight against pests. By launching a balloon trailing an insect trap, they sample insect populations at various levels. The experiments are conducted to find out how weather conditions cause insects to be deposited on crops and how such conditions affect the rise and fall in insect counts. (*Chemical Week, Apr 6, p126*)

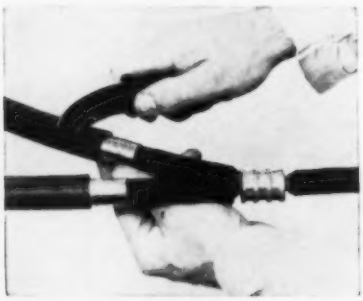


"Do-It-Yourself" With This Conveyor System

Pre-engineered, pre-fabricated components—reportedly easily assembled in the field—make up the "Ready-Span" pipe frame belt conveyor system. The conveyor consists of standardized sections of various lengths. Each section is made of four 1½-inch pipe chords connected by ¾-inch pipe diagonals to form a truss. Vertical diagonals are welded to the chords, horizontal diagonals are bolted. All accessories — idlers, walkways — clamp to the pipe. The trusses are made in all standard belt widths for spans up to 100 feet. **(Joy Manufacturing Co., 60 E. 56th St., New York City, N. Y., U. S. A.)**

"Shoot" Splices from a Gun

This new method protects and insulates electrical splices with epoxy resin injected into a mold made in the field. Called Resin Pressure Splice, the method will protect all types of cable, either aerial or underground. Here, step-by-step, is how it is used.



1. CABLE is prepared in the usual manner with desired connector. Insulation is scraped to provide good adhering surface for the epoxy resin.

2. MESH-LIKE TAPE binding builds splice to required thickness. Yet it permits resin to penetrate. Tape is over-wrapped with vinyl tape and injection fitting secured.

3. FABRIC TAPE is added for mechanical support. "UNI-PAK" container holds liquid epoxy resin and catalyst in separate compartments. Squeezing ruptures membrane between compartments. Mix goes into pressure gun.

4. GUN'S NOZZLE is inserted into injection fitting and trigger squeezed, forcing resin into the splice under pressure. Resin quickly hardens to a solid mass throughout the splice. Outside tape can be removed. (Minnesota Mining & Manufacturing Co., International Div., 900 Fauquier Ave., St. Paul, Minnesota, U.S.A.)

Four-Wheel-Drive Tractor

A new 300 horsepower (maximum output) four-wheel-drive tractor is known as the Caterpillar No. 668 (Series C). Primary applications of the No. 668 will be in powering scrapers, and in bulldozing and logging operations.

For bulldozer and pusher operation, a transmission providing eight forward and four reverse speeds is used, allowing speeds up to 26.3 miles per hour. For scraper applications a transmission with 10 forward and 2 reverse speeds is provided, with top speed of 32.1 miles per hour. **(Caterpillar Tractor Co., Peoria, Illinois, U. S. A.)**

High-Load Hoists

A new line of hoists features low headroom and offers precision load control to within .008 of an inch. The low headroom feature of the new hoists is achieved by a flat-lying "U" shaped arrangement of the motor, gear box and drum. The load control is achieved through instant torque of the motor and the use of two braking systems.

The hoists range in capacities of from 3 to 15 tons. They are available with plain trolley, hand-geared trolley, motor trolley, deck, lug and hook mountings. **(R. G. LeTourneau, Inc., 2399 S. MacArthur, Longview, Texas, U. S. A.)**

Spherical Roller Bearings

A new line of spherical roller-bearing pillow blocks incorporates a unique mounting feature. The mounting feature, called Micro-Mount, makes it possible to seat Sphere-Align bearings solidly on shafts quickly and easily.

The manufacturer recommends the new pillow blocks especially for applications in which self-alignment and ease of installation and maintenance are desirable. They are offered in both expansion and non-expansion types and are stocked in sizes to fit shafts from 2 7/8- to 8-inch diameters. **(Dodge Manufacturing Corp., Mishawaka, Indiana, U. S. A.)**

Coming: The One-Man Helicopter

THE object hovering in air in the picture above is Roto-Craft Corp.'s new one-man Pinwheel helicopter. Its rocket engines can carry 500 pounds to a maximum altitude of 12,000 feet and cruise at 60 to 70 miles per hour. The tiny engines, powered by hydrogen peroxide, weigh only a pound each.

The U. S. helicopter industry is embarked on a fierce competitive search for a cheap, one-man vehicle. Most of the current impetus comes from the military, but the industry is alert to the potential a civilian market could have. New designs must retain the helicopter's unique advantages—the ability to travel in all directions and hover almost motionless a few inches off the ground. At the same time, it must be economical to buy and maintain, simple and safe to operate, and have a reasonable ratio of range to load. These are some of the designs the industry has come up with. None are in production; all are experimental. (*Business Week, Apr* 20 *p*48)

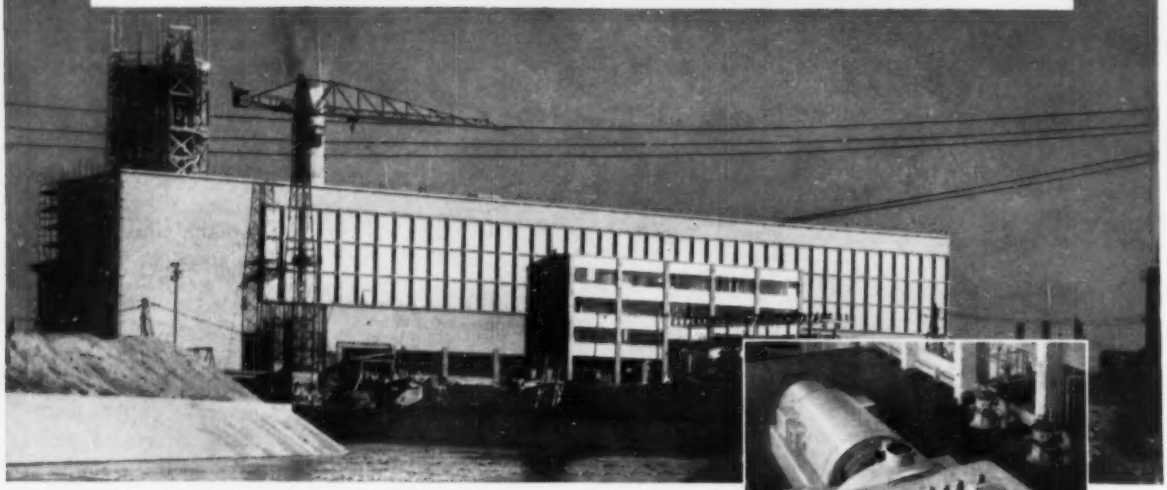
TORQUE problems are minimized in Bensen Aircraft Corp.'s Gyrocopter, kept in air by forward motion. Rotors are free-wheeling.

COLLAPSIBLE model produced by Hiller is the XROE-1. It is driven by small gasoline engine. Tail rotor counteracts torque.

STABLE MABEL, built by Kellett Aircraft Corp., has rocket power similar to Pinwheel. Name comes from its gyro-stabilizing system.

NAVY design award went in 1954 to XRON-1 Rotocycle, built by Gyrodyne Co. Pedals control brakes on rotor tips.

ELECTRIC POWER



30,000 kw Allis-Chalmers steam turbine-generator in the Torino plant. Other units available from 2000 kw through 500,000 kw capacity.

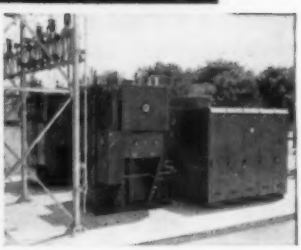
Allis-Chalmers equipment helps meet world power demands

In Torino, Italy, the modern power station shown above uses an Allis-Chalmers steam turbine to expand the nation's production of electric power.

Allis-Chalmers industrial machinery in countries throughout the world is at work to produce not only electric power, but more cement, metals, chemicals, paper and manufactured products.

Every major industry finds Allis-Chalmers a dependable source of basic machinery and valuable application experience. Consult the distributor in your country, or write Allis-Chalmers, Industries Group, Export Department, Milwaukee 1, Wisconsin, U.S.A.

The builder of over 16 million installed hydraulic turbine horsepower, Allis-Chalmers makes all types of hydraulic turbines — Francis, propeller, and impulse.



Allis-Chalmers builds all major equipment for electric power distribution — substations (illustrated), transformers, circuit breakers, and switchgear.

A-5368

ALLIS-CHALMERS

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Products of the Allis-Chalmers Industrial Equipment, Power and General Products Divisions are distributed by firms in these cities. Distributors of Tractor Group products also are located in principal cities.

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HAWAII—Honolulu, Hilo.
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IRAN—Teheran.
IRAQ—Baghdad.
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NORWAY—Oslo
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COMPLETE EQUIPMENT FOR TIRE FACTORY

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MORE PRODUCT DIGEST

Air-Suspension System for Road Vehicles

An adjustable pneumatic suspension system for road vehicles utilizes an air bellows instead of the normal metal spring. The bellows are constructed of rubber and cord materials, similar to those used in the manufacture of pneumatic tires. A special leveling value enables adjustments to be made to compensate for variations in the loading of the vehicle.

Several advantages are claimed for pneumatic suspensions of this type over conventional road springs. For example, the use of air as the suspension medium permits the stiffness of the spring to be controlled so that it increases when there is a rise in deflection —a factor which enables the system to be designed so that the build up of vibration due to recurrent resonant oscillations can be eliminated. **(Dunlop Rubber Co., Ltd., St. James's House, St. James's St., London, S.W. 1, England)**

New Line of Welding Heads

A new line of Unionmelt welding heads and assemblies for submerged melt welding has been designed especially for long dependable service life and adaptability to a wide range of applications. The new models are designated UEH-1, UEH-2, and USH-2 welding heads.

The UEH-1 welding assembly is designed for heavy duty operation. It uses an electronic voltage control and feeds wire up to $\frac{5}{16}$ inch (8.0 mm.) in diameter at currents up to 2,000 amperes.

The UEH-2 and USH-2 welding heads are of the same general construction but are somewhat smaller. The UEH-2 uses an electronic speed control for constant potential welding while the USH-w uses the standard arc voltage control. Both machines accommodate wire up to $\frac{1}{4}$ inch (3.3 mm.) in diameter and currents up to 1,200 amperes. **(Linde Dept., Union Carbide International Co., 30 E. 42nd St., New York 17, New York, U.S.A.)**

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Rubber-Tired Fork Truck With Choice of Transmissions

A new line of 15,000 to 20,000-pound capacity gasoline or liquefied-petroleum powered lift trucks features pneumatic tires. The trucks are available with either a straight, friction clutch transmission or fluid coupling transmission.

Note these other features:

Channel construction provides more visibility for the operator than previous models. Another innovation for improved visibility is the fork mounting. The forks extend 12 inches below the bottom carriage bar giving a clear view from heel to toe. The operator is seated high and in the center of the truck in order to take maximum advantage of the wide angle visibility.

Travel speeds up to 20 miles an hour are possible. Vacuum-powered hydraulic brakes assure smooth, safe stopping. **(The Yale & Towne Manufacturing Co., 11,000 Roosevelt Blvd., Philadelphia 15, Pennsylvania, U.S.A.)**

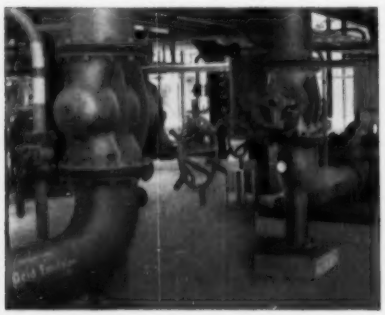
News of ROCKWELL

ROCKWELL-NORDSTROM VALVES SAVE MONEY ON SERVICES LIKE THESE:

Acetate Solvents	Brines	Kerosene
Air	Butane	Natural Gas
Alcohol	Cane Sugar Liquors	Oxygen
Alkalies	Citric Acid	Petroleum Oils
Ammonia	Coal Tar Solvents	Salt
Aniline Dyes	Ether	Sulphuric Acid
Sugar Liquors	Hydrocarbons	Tank Batteries
Bleach Liquor	Gasoline	Tannic Acid
Bottle Gas	Glycerine	Vacuum Lines
Bromine	Hydrogen Sulphide	Water

NEW ALLOYS for Rockwell-Nordstrom valves are tested at one of the four Rockwell research centers. Man above is analyzing valve metal for highest metallurgical standards to meet the ever-changing needs of modern industry.

STANDARDIZATION on Rockwell-Nordstrom valves for *any* process service (see partial list above) is easy, and profitable. Rockwell-Nordstrom is the *original* and world's most complete line of lubricated plug valves. Write for literature on your services.



LONGER LIFE, LOWER COST of Rockwell-Nordstrom valves have been proved on even toughest services (like acid lines above). Seating surfaces are *never* exposed to line fluids. Lubricant prevents metal-to-metal friction that causes costly valve wear.

ROCKWELL-NORDSTROM VALVES hold lightest gases (light hydrocarbon service above) or heaviest fluids because they are lubricant sealed for *positive* shut-off. Additional advantages: smooth, quarter-turn closure and easy, dependable operation.

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BELGIUM: *Societe Audco Belge, S.A., Brussels* (Valve Products)
Satam, S.A., Brussels II (Industrial Meter Products)
FRANCE: *Audco France S.A., Paris 15* (Valve Products)
Satam, Paris 8e, (Industrial Meter Products)
GERMANY: *Deutsche Audco Rockwell GmbH, Bielefeld*
GREECE: *I. I. Angelopoulos-N.D. Koutroufiotis, Athens*
IRAQ: *Technico Ltd., Baghdad*
ITALY: *Audco Italiana S.R.L. Milan* (Valve Products)
SNAM (Societa Nazionale Metanodotti), Milan (Gas Products)
KUWAIT (ARABIA): *International Trading Agency*
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SWITZERLAND: *Technogas, S.A.R.L., Lausanne*
TRINIDAD: *Neal & Massy Engineering Co., Ltd., Port of Spain*
TURKEY: *Yakin Dogu Makine A.S., Istanbul*
UNITED KINGDOM: *Audley Engineering Company, Ltd., Newport* (Valve Products)
Astral Industrial Meter, Ltd., Crawley, Sussex (Industrial Meter Products)
FORMOSA: *Allied Engineering Service, Taipei, Taiwan*
INDIA: *Tahira Industries (India) Ltd., Bombay 2*
PHILIPPINES: *Florencio Reyes & Company, Inc., Manila* (Water & Gas Meters)
The Edward J. Nell Co., Manila, (Valve Products Industrial Meters)
THAILAND: *Tanarak Company Ltd., Bangkok*
PAKISTAN: *Steel Brothers & Company Ltd., Karachi*

ROCKWELL PRODUCTS SERVE THE WORLD—Rockwell-Nordstrom Valves • Rockwell Gas Water, Industrial and Gasoline Meters • Gas Regulators • Taximeters • Dual Parking Meters Fare Registers • Delta Power Tools • Walker-Turner Power Tools • Edward Valves

MORE PRODUCT DIGEST

Medium-Power Diesel Engine

A new Diesel generator set is intended for use on locomotives and in other traction work, in drill rigs and pipeline pumping stations, and for electricity generation. It can also be used as a main propulsion unit for small vessels such as tugs, fishing and small cargo boats, and as a prime mover for auxiliary marine equipment.

The unit is powered by a four-stroke, direct injection engine with cylinders arranged in a 60°V, and a bore-to-stroke ratio of approximately 1:1. Built for a speed of 1500 revolutions per minute, it is supplied in three versions, with 8, 12 and 16 cylinders, the horsepower ranging from 400 to 1400 horsepower. Either one or two turbo-superchargers are fitted, according to the size of the engine. **(Societe Alsacienne de Constructions Mecaniques, Mulhouse [Haut-Rhin], France)**

Prefabricated Truck Bodies

Truck bodies which can be shipped overseas in package form, for assembly at destination by unskilled labor, are available to fit any standard commercial vehicle chassis. The various components are prefabricated in a light alloy.

The truck bodies are corrosion-proof in any climate and are assembled by means of identifying the components on graphic charts which make clear the manner and order in which the parts are to be assembled. The assembling operation takes only a few hours. **(Bonnallack & Sons Ltd., Basildon, Essex, England)**

New Accounting Machine

A versatile new office machine combines an 84-character, full keyboard electric typewriter with a high-speed accumulating register accounting machine. Because of its design, the machine can be used with standard forms as well as customer-designed posting and accounting systems. **(Burroughs Corporation, Detroit 32, Michigan, U.S.A.)**

Heavy-Duty Fork Truck

Named the Ranger-200, a 20,000-pound capacity pneumatic-tire fork truck features four-wheel drive and finger-tip direction controls. The machine is designed for heavy duty over rough terrain.

Direction control levers are located on the steering column within finger-tip reach of the operator. A single lever, also on the steering column, controls lifting and tilting movements. Power steering is standard.

In addition to four-wheel, power-assisted hydraulic spot-type disk brakes, a separate parking brake is mounted on the front drive axle. The truck will travel 25 miles per hour in both forward and reverse. **(Industrial Truck Division, Clark Equipment Co., Battle Creek, Michigan, U. S. A.)**

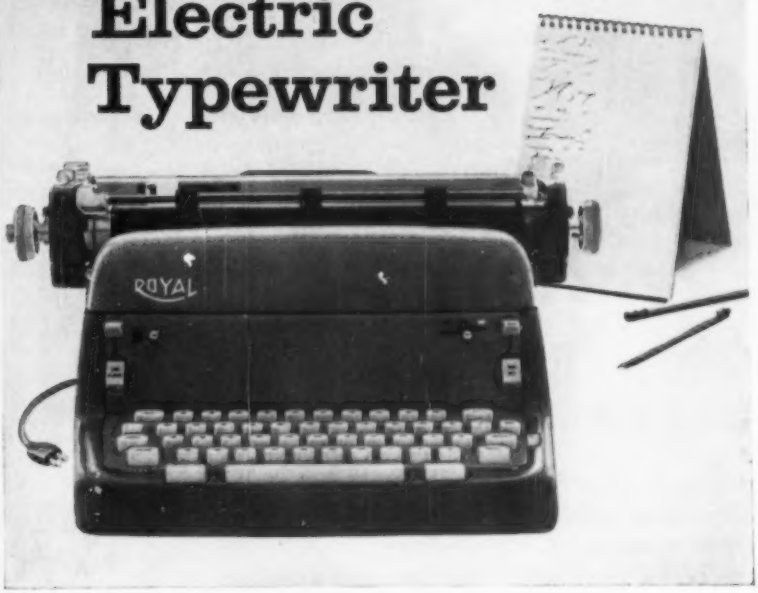
Heavy-Duty Battery

A new industrial-truck storage battery (TG Exide Ironclad) uses a new type of armored porous tubing. Made of polyvinyl chloride and braided glass fibers, it encases grid spines and active material of positive plates to curb loss of electrode through shedding. Although porosity of the new tubing is very high, openings are so minute that virtually no particles get through.

The battery weighs 6% more than the manufacturer's conventional unit of the same size. But for the extra weight, it provides 20% greater ampere-hour capacity and a 21% increase in watt-hour rating (at the 6-hour discharge rate). The unit is termed particularly effective at high discharge rates. **(ESB International, 500 Fifth Ave., New York 36, New York, U.S.A.)**

You can increase production as much as 14% with the all-new

ROYAL Electric Typewriter



It's true! Tests made with the Royal Electric Typewriter consistently resulted in production increases – even up to 14%!

And – not only did office production increase – work was neater, typing costs were lower, secretaries (and bosses) were happier. In just a short time, these electric marvels had more than paid for themselves.

Precision-built, and rugged enough to provide years of dependable service, the new Royal Electric has many time- and work-saving features not found on any other typewriter . . . features that make all other typewriters seem obsolete.

The best test for a Royal Electric is right in your office. Call for a demonstration; you'll be *amazed* at the results!

World's largest manufacturers of typewriters . . . with sales and service everywhere!

ROYAL®

ROYAL McBEE INTERNATIONAL Manufacturers and Distributors of Royal Typewriters and McBee Accounting and Statistical Systems

HIGH-SPEED
COMPACTION
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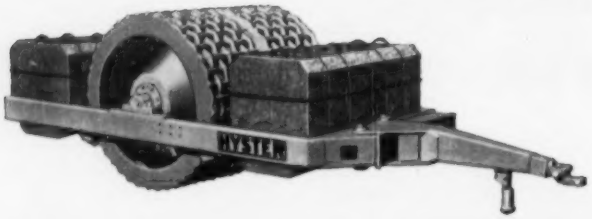


THE HYSTER "GRID" ROLLER DOES ALL THREE

Here is the machine road builders all over the world are using on all types of road construction—freeways, secondary roads, farm-to-market roads, access and logging roads.

Built for long life on any job — rock surfacing haul roads or high-speed compaction on expressways — the "Grid" roller is designed to give you low cost operation and maintenance. Its high capacity tapered roller bearings give long life. Its high-strength cast steel wheels resist wear in rock and abrasive materials. The heavy-duty frame prevents distortion in the toughest going.

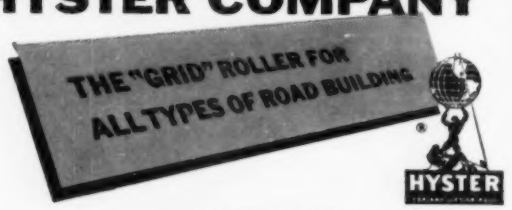
1 EMBANKMENT COMPACTION—High-speed rolling (up to 15 MPH towed by Caterpillar DW15 Tractor) matches compaction with yardage of high-speed earth movers.

2 ROCK CRUSHING — Pit-run rock quickly and efficiently crushed for base and surface courses on secondary road construction and repair.

3 BITUMINOUS SALVAGE — Quickly breaking down old ripped-up mat, the "Grid" Roller salvages all of the original aggregate and reusable binder for use in new surface.

HYSTER COMPANY

For full details, call your Caterpillar-Hyster Dealer.



EXPORT DEPARTMENT
1829 North Adams Street.....Peoria, Illinois
Factories:
Portland, Ore.; Danville, Ill.; Peoria, Ill.; Nijmegen, The Netherlands

MORE PRODUCT DIGEST

Hermetically Sealed Refrigeration Units

Hermetic reciprocating refrigeration units in sizes up to 60 horsepower are expected to reduce the cost, size, and weight of air conditioning systems for smaller buildings. The primary feature of a hermetic unit is that it eliminates "open drives" employing belt and pulley, a gear box, or other couplings.

Compressor and motor are mounted on a single shaft which is hermetically enclosed, sealing out dust and dirt. The result is that installation work and resultant cost is reduced, and the life of the equipment is greatly lengthened. **(Carrier Corp., Syracuse 1, New York, U.S.A.)**

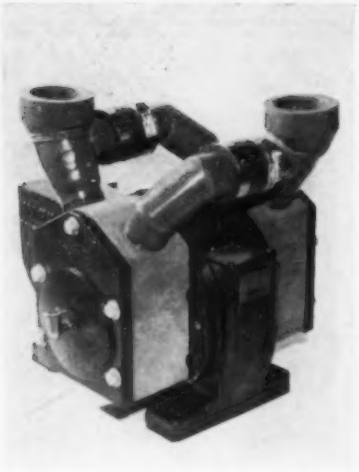
Automatic Reader Feeds Information to Computers

ERA (Electronic reading automatron) reading unit is said to enable computers to read and recognize ordinary printed material up to a rate of 500 characters per second. No special type face is required, and the reader can overcome the difficulty of reading distorted, smudged, defective or misplaced type, within limitations.

The ERA is an "eye" only; it does not store information. Its purpose is simply to convey the information it reads to suitable types of machine, feeding it to the machine as fast as it can be accepted. The system can operate wherever written information has to be fed into computing systems. **(The Solartron Electronic Business Machines Ltd., Dorking, England)**

Photographic Products

A new line of "Cronaflex" reproduction films includes contact film, projection film and direct positive film (a time-saving intermediate between original and the paper or cloth reproductions). All three products take pencil, ink, eradication, and ferricyanide etching. **(E. I. du Pont de Nemours & Co., Wilmington, Delaware, U.S.A.)**



Corrosive-Liquid Pump

Model 40 GPM Duplex self-priming pump can handle most corrosive liquids and slurries up to 70% solids (such as mud, abrasives, ice cream batter, etc.) at up to 40 gallons per minute in a continuous flow. The new pumps are available with housings made out of six materials, ranging from Bakelite to polyethylene, and 12 liners, including natural rubber, silicone rubber, hypalon, and polyvinyl alcohol.

The pumping action is based on the simple principle of pinching a tube. One rotating eccentric wheel draws while another pumps. **(Vanton Pump & Equipment Corp., 210 Sweetland Ave., Hillside, New Jersey, U.S.A.)**

Package Conveyor for Light and Heavy Packages

A new ribbed package-conveyor belt will carry lightweight packages as firmly as it carries heavy cartons. The new belt, called "Griptite," is especially designed for steep-angle conveyor operations in stores, factories, warehouses, and shipping rooms that handle both light and heavy merchandise packages.

The packages are held firmly in place by a series of inverted V-shaped rubber ribs that grip the cartons in either incline or decline operations. Extra protection for holding extremely lightweight packages in place is provided by raised ribs or cleats (also inverted V-shaped) spaced 18 inches apart. **(International B. F. Goodrich, Akron, Ohio, U.S.A.)**

Welding Head Manipulator

A new welding head manipulator and control console for longitudinal and circumferential welding has been designed for the purpose of universal positioning of a welding head and accurate variable speed traverse of the head. Both tungsten and metal inert gas arc-welding automatic heads may be mounted on the manipulator, which is of all-welded construction.

The electrical console provides all the necessary controls for complete programming of the welding operation. Electronic timers are provided. The console includes a welding power source with current slope control, accessories for control of shielding and back-up gases, and a self-contained water circulating unit. **(Airco International, 150 E. 42nd St., New York 17, New York)**

Get your share of a booming business with HEIL Automatic Cooling

Heil can be your key to steady profits in the multi-million dollar summer air-cooling business. The line is complete, with capacities to fit both residential and light commercial buildings. Both 50 and 60-cycle units are available, to operate either as independent coolers or as part of a central warm air-heating system.

Heating units available, too — Heil also offers you a complete line of heating equipment — oil and gas conversion burners, oil and gas-fired warm air furnaces, and oil and gas-fired boilers.

Every Heil unit is backed with 30 years of experience and leadership. For alert, aggressive dealers who want to build a profitable heating and cooling business, now is the time to get in touch with Heil.

Be the first . . . send coupon now!

Hydraulic dump bodies. Refuse and garbage collectors. Milk pick-up and storage tanks, and petroleum transport tanks. Dehydrators for drying forage, waste and wood products.

Heil plants at Milwaukee, Wis.; Hillside, N.J.; and Lancaster, Pa., have more than one million square feet of manufacturing space and produce quality products for more than 50 different businesses and industries.

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Established 1901

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I am interested in becoming an authorized dealer for Heil automatic cooling and heating units. Please send information on:

☐ Cooling equipment ☐ Warm air furnace-burner units
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THE NEW UNDERWOOD POST-MASTER "92"

SAVES ON OVERTIME—no more late nights at statement time.

EXTRA PRESTIGE—Neat, accurate machine-printed statements that impress customers.

FAST COLLECTIONS—Statements out on time; receivables in faster.

DOUBLE VALUE—Post-master 92 is useful as grand total adding machine, for use in between posting runs.

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TYPEWRITERS • ADDING MACHINES • ACCOUNTING MACHINES
SALES AND SERVICE THROUGHOUT THE WORLD

ADVANCE
World's Largest Exclusive Manufacturer of Fluorescent Lamp Ballasts

ADVANCE offers you the world's most complete line of fluorescent lamp ballasts. From this single source you can obtain a quality ballast to satisfy any requirement. ADVANCE ballasts are engineered and built to the highest standards . . . they are world renowned for performance and dependability.

Whether you are a manufacturer of lighting equipment, a specifier or an installer of fluorescent ballasts, to be sure of the finest, write today for descriptive literature to Mr. Theodore Ley, Export Manager, Advance Transformer Co., 2950 N. Western Ave., Chicago 18, Ill., U.S.A.

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MORE PRODUCT DIGEST

Automatic Whiteprinter

A new automatic whiteprinting machine, called the Crusader, is designed to reproduce at speeds up to 32 feet per minute, anything typed, written, drawn, or photographed on reasonably translucent material. Sensitized material is exposed under a 4000-watt high pressure mercury lamp and dry development of prints by ammonia vapors is instantaneous.

The Crusader is easy to operate. The tracing is fed into the machine with the sensitized material and the rest is automatic. The original tracing or copy is returned to the operator for additional feedings. Finished prints are delivered stacked in original sequence in an adjustable tray. For continuous yardage operation from rolls, an automatic wind-up device is available. **(The C. F. Pease Co., 3952 North Rockwell St., Chicago 18, Illinois, U.S.A.)**

A-C Sensitive Relay

A new alternating-current sensitive relay with transistor amplifier is designed to resist vibration, corrosion and shock. Its standard features include a two-pole, double-throw plug-in relay protected by a clear polystyrene dustproof cover; a long life plug-in transistor amplifier and power pack module; 12 volt direct-current sensing circuit and a low sensing-circuit current (less than 0.0002 amperes). No warm-up time is required and a convenient terminal board is provided for

making external connections.

Rated up to 10 amperes, 110 volts, 60 cycles, the relay is available in an open type panel or in a general purpose enclosure. **(Cutler-Hammer, Inc., 404 North 12th St., Milwaukee, Wisconsin, U.S.A.)**

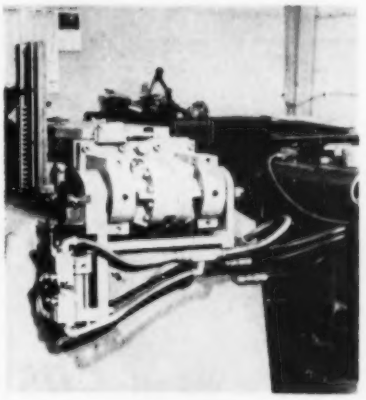
Offset Screwdrivers

New screwdrivers have a square body with the bit end offset and forged at a 45 degree angle to permit easy use around, behind, or under obstacles. Forged from vanadium chrome tool steel, they are available in four lengths from 4 to 6½ inches, with bit sizes from $\frac{3}{32}$ x $\frac{1}{32}$ inch to $\frac{5}{8}$ x $\frac{3}{32}$ inch. **(Owatonna Tool Co., 507 Cedar St., Owatonna, Minnesota, U.S.A.)**

Versatile Boring Machine

A small, high-precision unitized boring machine is reported to provide versatility and economy without sacrifice in accuracy. Designed around a number of standard, interchangeable units or "building blocks," the boring machine can be set up as a dozen different basic machines, with hundreds of combinations in tooling and fixture equipment—to perform a wide variety of boring, facing, turning, chamfering, grooving, and similar operations.

A major feature of the machine is a new multi-spindle unit with miniature precision boring heads that permits savings on a broad range of small work requiring the precision finishing of closely-spaced multiple holes. **(The Heald Machine Co., Worcester 6, Massachusetts, U.S.A.)**



Tube-Bending Machine

Powered by a standard ROTAC Torque Actuator, this tube-bending machine produces over 1500 automobile radiator parts per hour. The entirely automatic machine cycles continuously to bend 2-inch lengths of ⅜-inch outside-diameter thin-wall copper tubing 180 degrees without deforming the tube diameter.

Conveyed from a rotary feed unit to a vertical magazine, the pieces are gravity-fed to a cylinder which thrusts them horizontally into a bending die. Another cylinder, mounted on the bending die, clamps the parts. The entire die assembly, which is attached directly to the Actuator shaft, is then rotated upward in a 180° arc by rotation of the bearing-mounted shaft. The part is automatically ejected on the downward arc and the cycle repeats. **(Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Michigan, U.S.A.)**

Jet Air Sampling Device

A air sampling device, small enough to be held in the palm of the hand, has been designed to help air pollution experts determine what harmful substances may be in the air. Weighing less than two pounds, and costing only a fraction of existing equipment for doing the same job, the new device employs a miniature jet engine powered by low-pressure liquefied gas. Besides a valve to control the supply of gas, there are no moving parts, thereby reducing or eliminating operating and maintenance problems.

Principal part of the air sampling device is an aspirator or "pump" utilizing a micro-venturi principle in which Du Pont "Freon" propellent is ejected through a jet nozzle at high speed, creating a vacuum in the venturi cavity. Different size orifices can be inserted between the supply container of "Freon" propellent and the venturi jet to control, automatically and continuously, the operating pressure of the aspirator and the air sampling rate. **(Union Industrial Equipment Corp., 175 Main St., White Plains, New York, U.S.A.)**

Aluminizes TV Screens

A new high-production unit aluminizes color-TV plates or the screens of black-and-white picture tubes interchangeably. The self-contained unit has its own vacuum pumping system, which can handle two color plates or two black-and-white tubes at the same time.

For color plates, a removable metal cone supports the plates. To switch to black-and-white tubes, all that is required is to remove the cones and insert the necks of the tubes into the openings of the evacuation chamber. The filament holders, from which are hung the small staples of aluminum that is vaporized in the aluminizing process, are slightly different for each type of tube, but they can be quickly and easily interchanged. **(F. J. Stokes Corp., 5500 Tabor Road, Philadelphia 20, Pennsylvania, U.S.A.)**

Precision built

Easy to handle

HITACHI

Convertible Shovel

Does Big Jobs Fast

The Convertible Power Shovel featured by Hitachi, Ltd. has not only been in extensive use in Japan but also has been exported to many foreign markets where full play in dam construction and other development work has been given to confirm its excellent qualities of solid construction, precise work, swift operation and ease in handling. The versatility of this Hitachi Convertible Shovel is a most valuable characteristic as it can be used with a series of interchangeable front-end attachments, including Shovel, Drag Shovel, Dragline, Crawler type Crane with Hook, Crawler type Crane with Bucket and Skimmer, Pile Driver, etc.

Cable Address: "HITACHY" TOKYO

Hitachi, Ltd.

Tokyo Japan

Rugged Vehicle Needs No Road

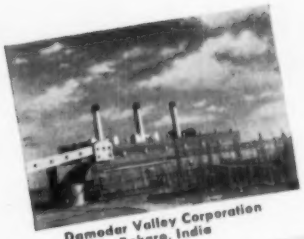
The Unimog is a multi-purpose industrial and agricultural vehicle. Its rigid, raised axles permit high ground and crop clearance (18 inches) in spite of a small wheel. Special equipment can be used with the vehicle's front and rear power takeoffs.

The vehicle's six forward speeds range from 0.6 to 31 miles per hour, plus two crawling gears with speeds from 0.1 to 1.2 miles per hour, and two reverse gears. Shifting from rear wheel to 4-wheel drive and to the locking of the differentials is accomplished in full motion without the use of a clutch. The engine is a 25-horsepower 4-cylinder diesel with a Bosch fuel injection system. **(Daimler Benz A. G., Stuttgart-Unterturkheim, [Wurth], Germany)**

Fights Liquid-Metal Fires

A piped fire extinguishing system utilizing Met-L-X dry powder is especially effective on fires in liquid metals (such as sodium). It is designed to give protection against fires in areas where use of manual extinguishers is impossible—because of radiation hazards or the denser, caustic smoke of liquid-metal fires.

The Met-L-X system extinguishes liquid metal fires by discharging dry powder through nozzles installed over the hazard areas. Piping is so situated as to coat all vertical surfaces and at the same time distribute an even layer of Met-L-X over flooring to guard against fire from spilled metal. **(Ansul Chemical Co., 60 E. 42nd St., New York 17, New York)**


Damodar Valley Corporation
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La Electricidad de Maracay
Maracay Venezuela

Societe Termo-Elettrica Siciliana
Palermo, Sicily

C. A. Electricidad de Caracas
Caracas, Venezuela

Compania de Acero del Pacifico
Concepcion, Chile

Petroleous Mexicanos
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PROJECTS IN POWER —THE WORLD OVER

Kuljian power engineers have designed, engineered and supervised construction of more than eighty power plants throughout the world . . . representing a total electric generating capacity of well over two and one-half million kilowatts . . . a total investment in excess of one-half billion dollars.

Kuljian power projects for utilities and industry have ranged in scope from site location studies, economic surveys and load forecasts . . . to design, procurement, construction supervision, and initial operation of complete power systems.

Whatever your program calls for . . . a steam or hydro power plant, transmission lines, distribution systems, water resource development, or the expansion and modernization of industrial power facilities . . . Kuljian offers *every* service to meet your needs.

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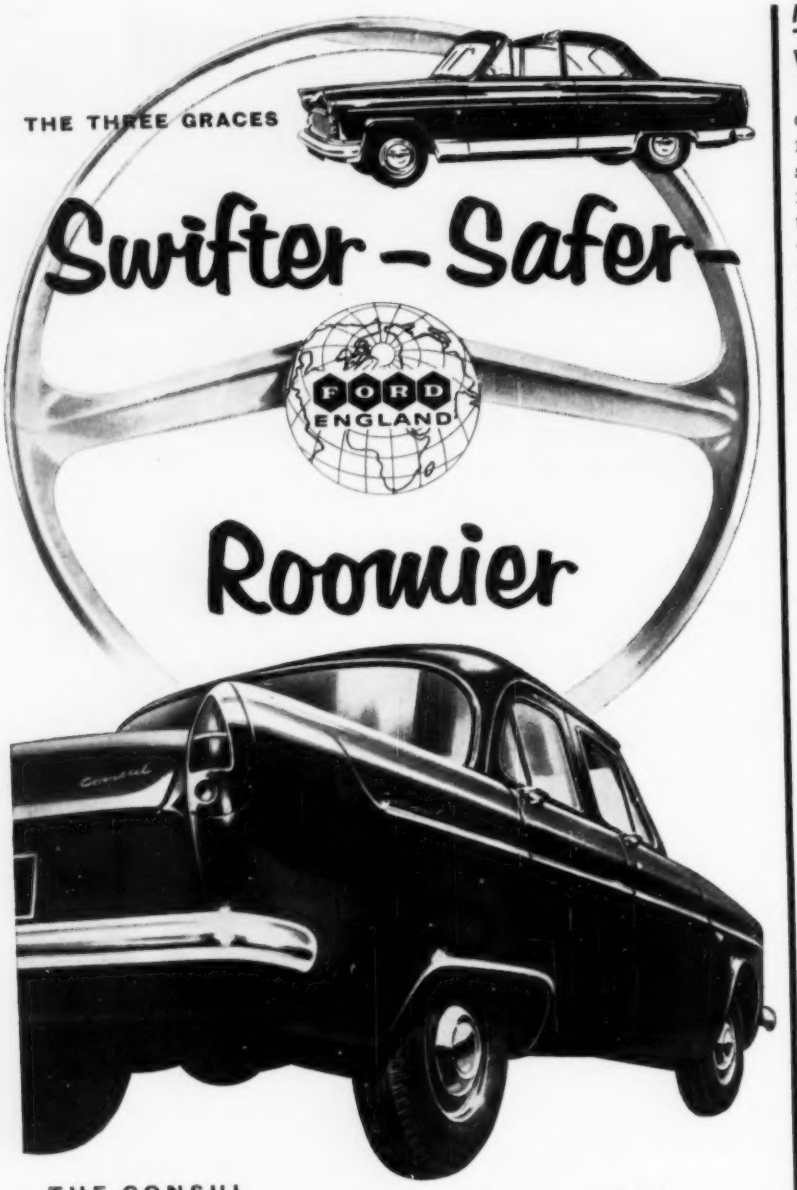
BRANCH OFFICES THROUGHOUT THE WORLD



THE CONSUL

The Zodiac, the Zephyr, the Consul . . . each a leader in its own class. Take a look at automatic transmission too, on the Zephyr and Zodiac . . . it's truly two pedal driving.

LONG, LOW, WIDE . . . room for six in luxurious comfort . . . brilliantly styled . . . sweeping lines, perfectly proportioned. Exciting performance . . . 'over-square' motor . . . larger capacity, lower revs . . . extra "punch" for a faster get-away. More space, more style . . . the 'Three Graces' from England are at your Dealer's now. Ask for a demonstration.

FORD ENGLAND MOTOR COMPANY LIMITED

... and World-Wide Service too!

MORE PRODUCT DIGEST

Welding and Cutting Outfit

This new light-duty welding and cutting outfit is especially suited for auto repair shops, sheet metal shops, small industrial plants, farms, plumbing and heating contractors, and similar applications where intermittent service makes low cost a factor in equipment selection.

The outfit is designed to handle welding, brazing, heating, and cutting operations. It will weld metals up to $\frac{3}{16}$ inches thick (or up to $\frac{5}{16}$ inches thick if larger tips are used) and cut steel plate up to an inch thick.

All the equipment necessary to do a welding or cutting job is included. Two style 8000 single-stage regulators, twin $\frac{3}{16}$-inch gas hoses with connections, the style 400 lightweight welding torch with a mixer and two tips, and the type 1490 cutting attachment with one tip, are the major items supplied. A wrench, sparklighter, and goggles round out the outfit. When assembled for cutting, the combined weight of the torch and cutting attachment is only 19 ounces; over-all length is $12\frac{1}{2}$ inches. **(Airco Company International, 150 East 42nd St., New York 17, New York, U.S.A.)**

Speeds Hand Sorting

The new Remington Rand Vertical Multi-Sort speeds the sorting of any media up to $8\frac{1}{2}$ inches wide and $5\frac{1}{2}$ inches high for filing, posting, analysis and reference, and saves 50% to 75% of the time required for most ordinary hand sorting.

The Multi-Sort introduces a novel sorting design. The sorting starts at the front of the sorter and expands to the far end of the device as additional media is filed. The dividers will always return to their original starting angle without any effort or attention on the operator's part, assuring the best sorting angle.

The dividers are indexed alphabetically in scientifically established breakdowns of the alphabet to fit the needs of individual requirements. **(Remington Rand International, 315 Fourth Avenue, New York 10, New York, U.S.A.)**

Looks like water, but...

it's really an amazing chemical bringing you wonderful new textile fibers, plastics, and rubber

FROM NATURAL GAS, air, and ammonia, science has created one of the most versatile of modern chemicals—a crystal-clear liquid called acrylonitrile*. This useful chemical is the stepping stone to an ever-increasing number of man-made wonders that lead to more new things for all of us.

DYNEL, Union Carbide's remarkable textile fiber, is made from acrylonitrile. Fluffy and soft, this tough fiber is woven into everything from work clothes to evening dresses. And women everywhere are excited about the new furlike coats made with Dynel.

SYNTHETIC RUBBER made from acrylonitrile goes into shoe soles, gasoline hose, and many industrial products that must withstand hard use. When certain plastics are blended with acrylonitrile, they become shock resistant and gain a toughness that helps them last much longer.

ACRYLONITRILE is only one of over 400 chemicals made by the people of Union Carbide. They are constantly at work developing still more chemicals to make better products possible.

FREE: *Learn how Union Carbide products and research help satisfy basic human needs. Write for the 1957 edition of "Products and Processes." Ask for booklet 1M-6.*

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Division of Union Carbide Corporation
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*Pronounced: A-krill'o-ni-treel

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For Shipping, Stevedoring,

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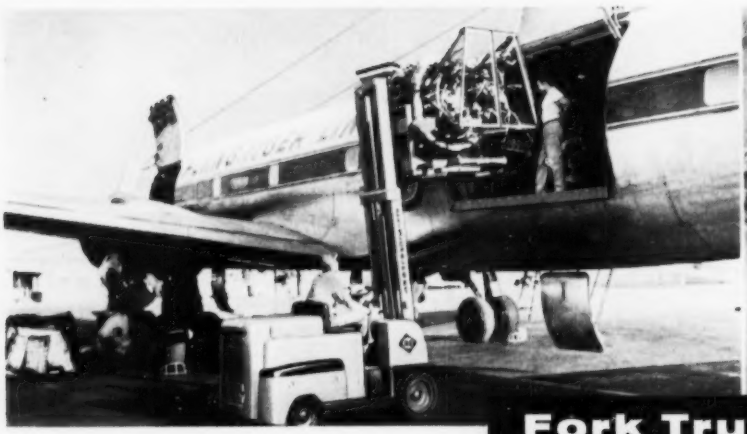
Industry — Any Use...

There's Allis-Chalmers Material Handling Equipment to Meet the Need

Whether you want to lift material, load it, stack it, carry it or pull it, there is Allis-Chalmers equipment to do the job with real savings in time and money. Each unit is suited to specific requirements, each is built to deliver top performance. Ask your Allis-Chalmers material handling dealer to show you machines to match your needs.



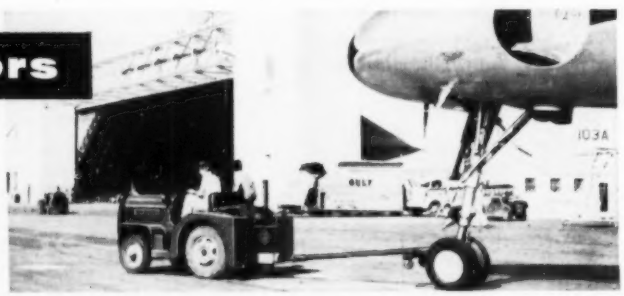
Fork Trucks

Over half a hundred models and sizes with outstanding operating and service advantages. Capacities range from 2,000 to 8,000 lb. Choice of fuels: gasoline, LP gas, or diesel for extra safety. You can have either conventional or torque converter drive, and solid cushion or pneumatic tires. Complete line of interchangeable attachments.

For Hazardous Areas — The Allis-Chalmers Safety Diesel was developed for docks, chemical plants and other areas where a spark could touch off an explosion. Its diesel engine, of course, has no ignition system; all other electrical devices are eliminated. As further safeguards, the manifold is water-cooled and the exhaust passes through a water quench.

Industrial Tractors

Thirty gasoline and diesel models with drawbar pulls up to 12,000 lb. Compact, highly maneuverable, these tractors are designed for towing planes or other vehicles, moving heavy machinery — are also used for maintenance work and operating auxiliary equipment.



ALLIS-CHALMERS, EXPORT DEPARTMENT MD657, TRACTOR DIVISION, MILWAUKEE 1, U.S.A.

ALLIS-CHALMERS

Builders of Machinery Since 1847

BHE-9

MORE PRODUCT DIGEST

Telescopic Hoist

Lowered costs of bulk hauling—by increasing dump truck payloads—are offered by a new series of telescopic hoists. Weight savings have been achieved on models HMT 63-102 and HMT 63-117 through the use of special alloy steels, manganese bronze sleeve bearings, and higher designed hydraulic pressure systems.

As an added feature, these hoists are the first examples of truck-mounted hydraulic equipment to incorporate the new SAE "O" ring, plus 37° flare SAE fittings, in hydraulic pressure lines. These fittings, which replace old style pipe thread fittings, are simpler and quicker to apply or uncouple, and provide tighter drip-proof connection without the use of pipe dope, long wrench extensions and brute force. **(The Heil Co., Export Dept., 3000 W. Montana St., Milwaukee 1, Wisconsin, U.S.A.)**

Machine Makes Powdered Foods More Wettable

A new processing machine has been designed to make powdered foods more easily wettable. Because of its metered feed of material, the powder, the solubilizing agent, and other additives are instantly blended.

The unit—called a Solubilizer—is a companion piece to the manufacturer's Instantizer, which converts dry skim milk powder to "instant" dried milk through an agglomerating process. Together, the Solubilizer and Instantizer can prepare a wide variety of "instant" mixes.

Material to be processed in the machine is introduced through a bin which gravity feeds the powders through an enclosed bank of spray nozzles which atomize the solubilizing agent. The material is then screw-conveyed from the machine to intermediate packaging equipment. The machine requires 5 psi (pounds per square inch) steam pressure, 20 psi air pressure and 2 electric horsepower. It will produce 400 pounds of product per hour. **(Blaw-Knox Company, 300 Sixth Ave., Pittsburgh 22, Pennsylvania, U.S.A.)**

Make *all* the COPIES you need . . . quickly, easily, economically with ANTARA

Printmaster 810 – Moderately priced whiteprinter, for finest large-volume production. Synchronized developing and printing. Electronic fingertip controls. For prints from originals up to 42″ wide (107cm) at speeds up to 40′ (12.2m) per minute.

Streamliner 400 – Economical 2-step whiteprinter. Makes prints up to 42″ wide (107cm) at speeds up to 24′ (7.3m) per minute. Uses sheets or continuous roll stock. Front delivery of copies. Automatic stacking and collating.

ANTARA O-M – Desk top model with many of the fine features found only on larger machines. Small in size, yet provides large-volume capacity. For prints and copies from originals up to 16″ wide (41cm) at speeds up to 30′ (9.14m) per minute.

With the versatile ANTARA copying process it takes only *seconds* to make the copies you need. This method produces . . . *on 1 machine* . . . copies or prints of charts, reports, drawings, graphs, forms, letters, etc. . . . *anything* which is typed, written, drawn or ruled on paper that is translucent (lets light through).

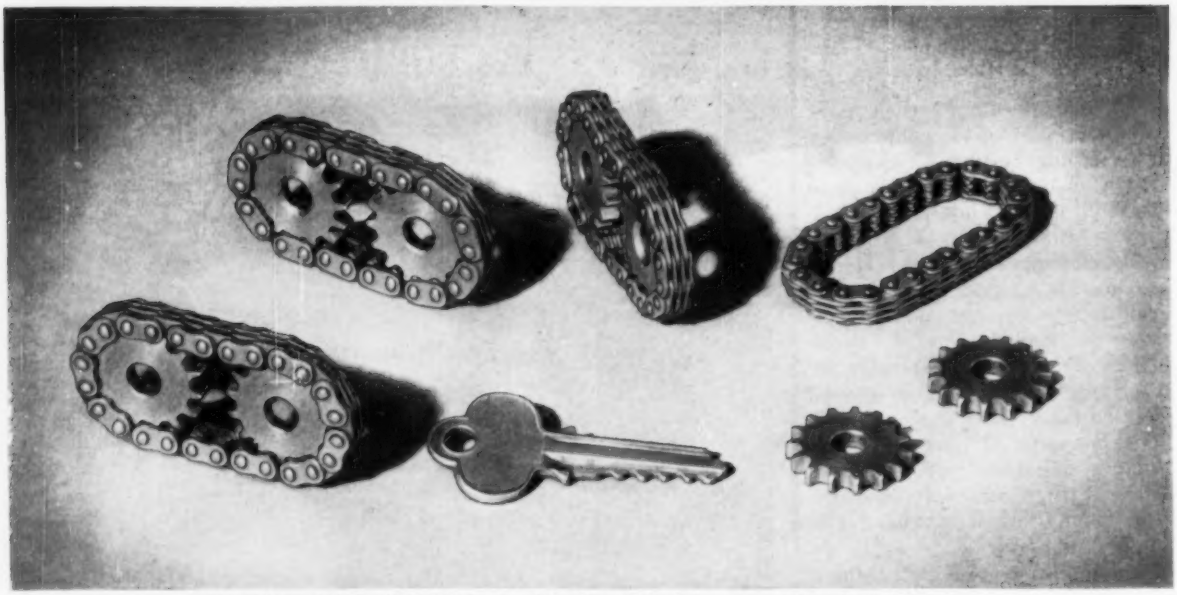
ANTARA *is economical and easy to use.* Just put in the originals, and out come the clear, dry, legible copies. *Exact* copies of the originals, they cost less per copy than your daily newspaper. There are no messy carbons, no duplicating inks, no stencils.

ANTARA *saves time.* There's less re-writing and re-typing . . . *never* any proofreading or corrections to be made. Copies can be produced in several colors, on a variety of materials . . . paper, cloth or foil. A "must" for every efficient organization and office, there's an ANTARA machine that's perfect for *your* requirements.

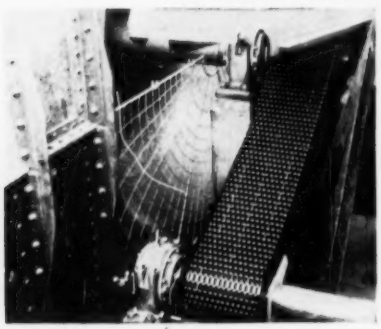
Bambino – No larger than a typewriter. Can make 200 copies an hour from originals up to 9″ wide (23cm) or from 8′ to 10′ (2.5 to 3m) per minute on continuous roll. Low in cost; extremely economical to operate.

For information, write: ANTARA, Diazo Division, General Aniline & Film Corporation, Johnson City, N. Y., U. S. A.

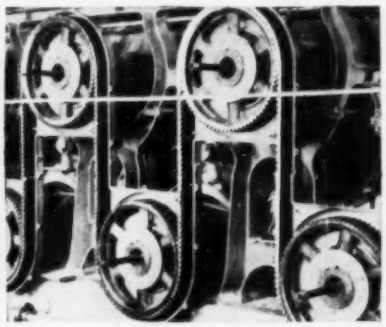
ANTARA representatives are located in all principal cities of the world. Write direct for further information, which will be airmailed to you promptly by: ANTARA, Diazo Division, General Aniline & Film Corporation, Johnson City, New York, U.S.A. Please address Department 10F.



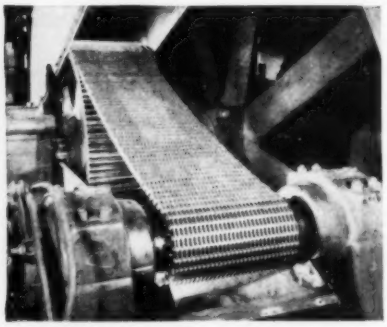
FOR LIMITED SPACE— Link-Belt 3/16-in. pitch silent chain drives transmit fractional horsepower smoothly, quietly at high or low speeds on centers no longer than a door key. Other silent chain drives are available in sizes up to 2-in. pitch for transmitting thousands of horsepower.



FOR UNFAILING SERVICE — On vehicular tunnel ventilating systems, silent chains have operated for 30 or more years.



FOR ACCURATE TIMING—Silent chain delivers uniform angular velocity positively and reliably on this paper dryer.



FOR HIGH LOADS—This 30-inch wide silent chain drive transmits 450 horsepower in rugged steel mill service.

Teeth, not tension

give Link-Belt silent chain over 98% efficiency and exceptional life

High speeds, heavy loads, extreme accuracy—these requirements of modern, high-production machines demand *positive* power transmission. And no drive handles them all with the smoothness and ease of Link-Belt Silverstreak silent chain.

Combining the quiet flexibility of a belt with the durability of a gear, low-cost Link-Belt silent chain maintains precision efficiency throughout its long life. Tooth-to-tooth, no-slip action provides constant ratios for full productive capacity.

This is just one of Link-Belt's broad line of power transmission products — chain, enclosed drives, couplings, bearings and accessories. Next time you're faced with a drive problem, weigh past results against the benefits of Silverstreak silent chain. You'll find basis for comparison in Book 2425. Call your representative or write to LINK-BELT COMPANY, Dept. 6-MD, 2680 Woolworth Bldg., New York 7, N. Y.

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● YOUR MANAGEMENT READING

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Plastic Design in Building—The British are doing a lot of pioneer work on the "plastic" theory of building—which can cut materials cost and design time by substantial amounts. (See MD, February.) A new book, "The Plastic Methods of Structural Analysis," explains the basic concept, deals with three methods of analysis—explaining and illustrating each. Price: 45s. net or $6.30. (Chapman and Hall, 37-39 Essex Street, London WC 2, England.)

Trading Abroad?—Two new directories may be helpful. A 74-page booklet lists—and describes—trade promotion and economic development organizations (both government and private) throughout the world. Price: $0.40. (Management Digest, 330 West 42nd Street, New York 36, New York) . . . The German-American Trade Promotion Office has published a 370-page guide to business in Germany—including tax and trade regulations, general economic information, advertising media, and a directory of exporters. Price: $3.50. (Nordeman Publishing Co., 14 East 62nd Street, New York 21, New York.)

Finding Managers—"The Selection of Management Personnel" will help you in the job of picking out potential managers—in the light of the latest research in the field. Case studies of actual company practices are included. Price: Two volumes, $15.00. . . . "New Dimensions In Office Management" talks about new tools and techniques for efficient office management. Price: $1.75. (American Management Association, 1515 Broadway, New York 36, New York.

Bulletins From Industry—Copies Catalog explains different office duplicating processes—and contains a wide range of samples. (A. B. Dick Company, 5700 W. Touhy Avenue, Chicago 31, Illinois). . . . Hitachi products—electric and industrial machinery, rolling stock, communications equipment, scientific research instruments, electric appliances, wires, cables, and insulating materials—are described in Catalog GM-026 (also available in Spanish). (Hitachi, Ltd., 4, 1-chome, Marunouchi, Chiyoda-ku, Tokyo, Japan). . . . "How to Buy a Used Machine Tool" answers eight basic questions on how to get the most machine for the money. (S & S Machinery Company, 140 53rd Street, Brooklyn 32, New York.)

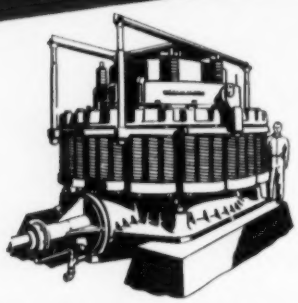
Plastic Tooling—The most complete bibliography yet compiled on plastic tooling is being offered by the American Society of Tool Engineers Research Fund. You'll find 254 references and abstracts of every major writing concerning plastic tooling since its inception. Price: $1.50. (American Society of Tool Engineers Research Fund, 10700 Puritan Avenue, Detroit 38, Michigan.)

All the World's Taxes—The Harvard Law School's new World Tax Series, several years in the making, consists of authoritative information on national tax systems throughout the world. Each volume covers one country. The reports seek to achieve two basic goals: (1) to describe each country's tax system in its own legal and administrative terms; and (2) to present each system in such a way that it can be compared, point by point, with other nations. The first two volumes in the series cover: "Taxation in the United Kingdom" (Price: $15.00) and "Taxation in Brazil" (Price: $10.00). (Little, Brown & Company, 34 Beacon Street, Boston 6, Massachusetts.)

Molybdenum...

and SYMONS CONE CRUSHERS

The view at the left shows a specimen of an etched cross section of a modybdenum ingot. *(Photo courtesy Climax Molybdenum Co.)*



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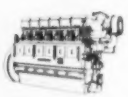

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**Molybdenum, from the Greek "MOLYBDOS", meaning lead, has its main commercial source in the mineral molybdenite. Increasing production of molybdenum has been essential for the manufacture of alloy steels used extensively in aircraft, automotive, heavy machinery, and many other industries.*

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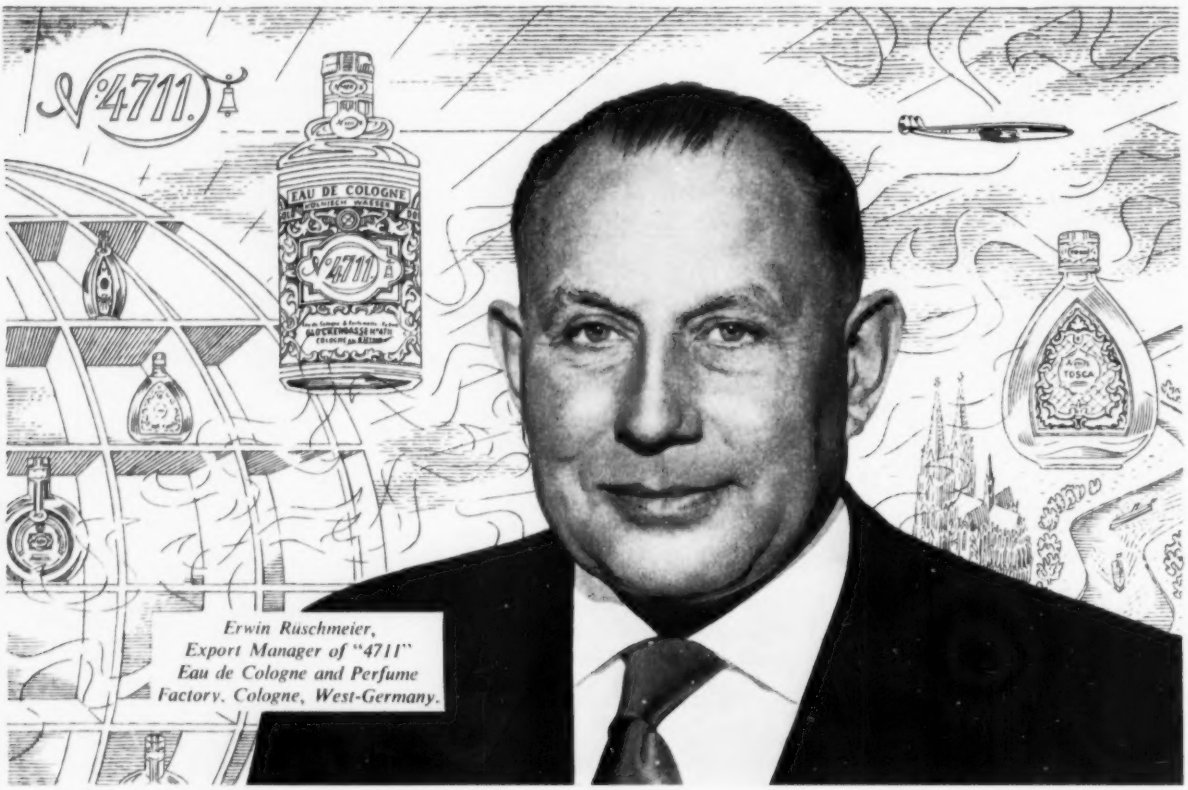

Erwin Rüschmeier, Export Manager of "4711" Eau de Cologne and Perfume Factory, Cologne, West-Germany.

He gives millions a cool head...

Export is the 7th sense of Erwin Rüschmeier (number 6: salesmanship). He started in 1920, a bustling Boy Friday for a firm which dealt in everything from ships to safety pins. Young Erwin, in search of a challenge matching his energy, soon went overseas. Five years later he returned to his first employer, heading the paylist, as manager. His colleagues declare he scents his sales. No pun is intended although Erwin literally did just that when he linked his future with that of the famed Eau de Cologne "4711". Today, Mr. Rüschmeier, who is in his mid-fifties, exports "4711" to some 90 foreign countries. When the city of Cologne was inspected by Napoleonic troopers for billeting, the houses were numbered. The home plant got the number "4711". The trooper who tagged the house never dreamed he was making brandname history. But he did, for the classic coolness of the product, sold under the figure sign won world-wide acclaim. Erwin Rüschmeier found a life-task in this export of relaxation. He does not stick to a pin-covered map, he's often on the spot. But if possible, Mr. Rüschmeier slips off to his family refuge in the romantic Seven Mountains of the Rhine. His business philosophy is logical. "No world trade without flying," he says, "and flying means KLM. Like '4711', KLM is synonymous with comfort around the world."

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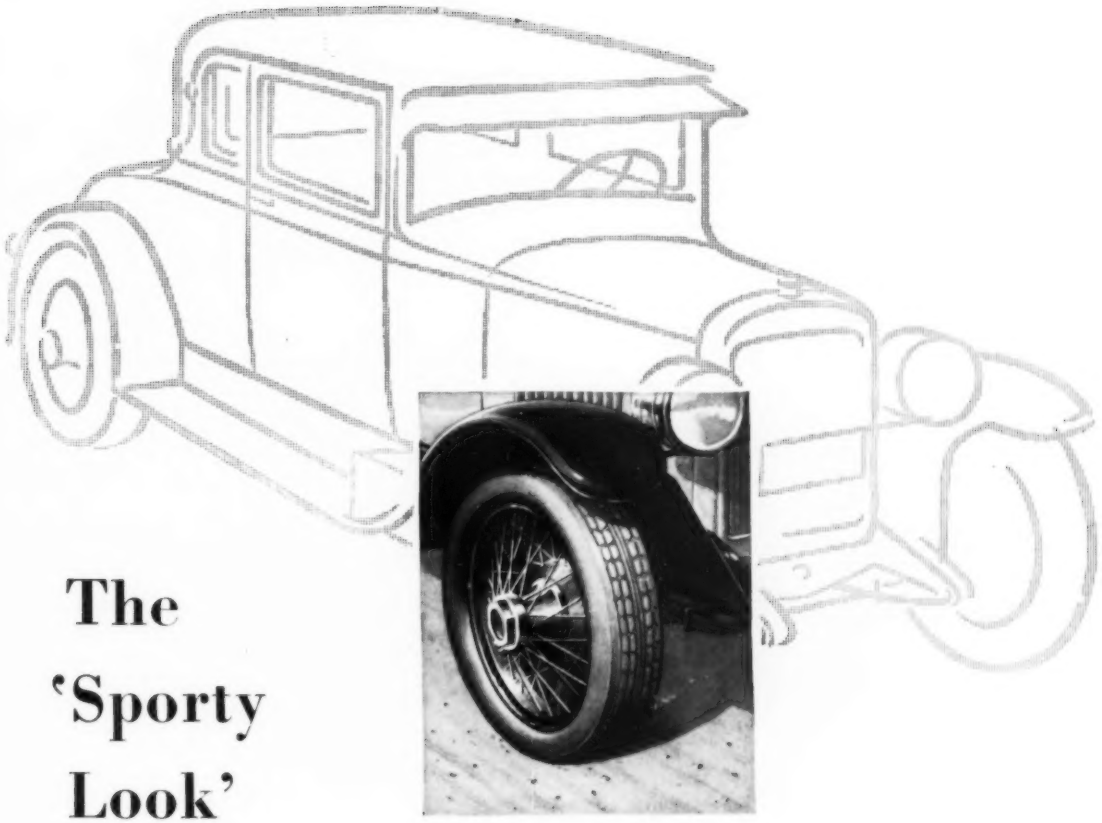
ROYAL DUTCH AIRLINES

All over the world people of sound judgement fly KLM



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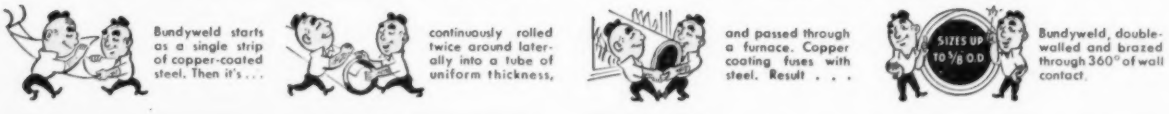
WHY BUNDYWELD IS BETTER TUBING


Bundyweld starts as a single strip of copper-coated steel. Then it's . . .
continuously rolled twice around laterally into a tube of uniform thickness,
and passed through a furnace. Copper coating fuses with steel. Result . . .
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Bundyweld, double-walled and brazed through 360° of wall contact.

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DOUBLE-WALLED FROM A SINGLE STRIP

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High bursting point	Takes plating
High endurance limit	Shock-resistant
Extra-strong	No inside bead
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